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CONTENTS

ABDOMINAL SURGERY

Current Management of Ascites 423

M. Judson Mackby, M.D., F.I.C.S., San Francisco, California

Surgical Treatment of Cirrhotic Ascites with a New Operation (Pleuroperitoneostomy) 436

I. El-Toraei, M.Ch., D.S., M.B., Ch.B., F.I.C.S., Cairo, Egypt

Absorption of Ascitic Fluid by Intestinal Entectropy: An Experimental Study..... 446

N. Christeas, M.D., F.I.C.S., G. Kottakis, M.D., F.I.C.S., and M. Georgiades, M.D., Athens, Greece

Inguinal Hernia: A Survey of Nine Hundred and Seventy-Seven Cases..... 451

Timothy A. Lamphier, M.D., F.A.C.S., F.I.C.S., D.A.B., Guy Sciaccia, M.D., John Covino, M.D., Henry Robinson, M.D., Louis Siegel, M.D., John Pepi, M.D., and Ronald I. Goldberg, M.D., Boston, Massachusetts

Biliary Ileus 462

Helio Silva, M.D., F.C.B.C., F.I.C.S., Rio de Janeiro, Brazil

CARDIOVASCULAR SURGERY

The Surgical Treatment of Acute Arterial Thrombosis in the Lower Extremity..... 471

H. P. Totten, M.D., M.Sc. (Surg.), F.I.C.S., D.A.B., Los Angeles, California

GENITOURINARY SURGERY

Ureteral and Urethral Injuries Associated with Gynecologic and Obstetric Practice..484

Clarence Schneiderman, M.D., F.A.C.S., and George J. Strean, M.D., F.A.C.S., Montreal, Canada

Surgical Treatment of Occlusion of the Spermatic Tract 495
Charles A. Jöel, M.D., Ph.D., F.I.C.S., Tel-Aviv, Israel

OBSTETRIC AND GYNECOLOGIC SURGERY

Intrapartum Bleeding 500
John J. Gamble, M.D., D.A.B., Albany, New York

ORTHOPEDIC SURGERY

Do "Above-Elbow Amputees" Use Their Prostheses? A Clinical Study.....506
Everett J. Gordon, M.D., and Eleanor Dibble, M.S.W., Washington, D.C.

PROCTOLOGIC SURGERY

Characteristics of Colonic Carcinoma: Management of Complications.....518
Claude J. Hunt, M.D., F.A.C.S., F.I.C.S., D.A.B., Kansas City, Missouri

TRAUMATIC SURGERY

Basic Philosophy, Principles and Objectives in Total Rehabilitation.....520
Louis B. Newman, M.E., M.D., Chicago, Illinois

EDITORIAL

A History of Hospitals 527
Charles U. Letourneau, M.D., Chicago, Illinois

NEW BOOKS 550

ABSTRACTS FROM CURRENT LITERATURE 554

COLLÈGE INTERNATIONAL DES CHIRURGIENS
GENÈVE

FOUNDED BY DR. MAX THOREK

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Abdominal Surgery

Current Management of Ascites

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The nature and management of ascites, particularly its occurrence as a complication of late Laennec's cirrhosis, are discussed. The treatment of this type of ascites is primarily medical, though if it proves refractory and causes severe symptoms it may become necessary to resort to surgical intervention. The author presents a comprehensive review of the various operations currently employed, pointing out their advantages and disadvantages.

THE FIRST surgical procedure deliberately performed in the hope of alleviating ascites was an omentopexy by van Moulen in 1889. The operation was popularized in 1896 by Morrison. In 1907, Perrot divided the saphenous vein, swung the distal end cephalad and anastomosed it to the peritoneal cavity. Starting about 1910, a number of surgeons, among them Handley, Flambotti, Fauvel, Frank and Ralston, attempted to drain ascitic fluid into the subcutaneous tissues by means of silk sutures, glass and rubber tubes and

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steel rods. Ferguson performed a right nephrectomy and anastomosed the renal pelvis to the peritoneal cavity. Since the appearance of the original peritoneal button devised by Patterson in 1910 many modifications have been developed, and one of its more efficient variants may still be found in some operating rooms today as the Crosby-Cooney-Lord button.

The foregoing paragraph is a bare outline of the multitude of extremely ingenious (and unphysiologic) operations designed for the relief of ascites. It is highly likely that all of these procedures have done more harm than good and should never be utilized in the management of ascites. As a matter of fact, simple abdominal paracentesis should be reserved exclusively for the most extreme ascites producing respiratory and/or digestive embarrassment.

Pathologic Physiologic Aspects of Ascites.—Ascites is a complex phenomenon that is not capable of explanation on a simple mechanical basis. Mechanical factors, however, at least in portal cirrhosis, play an important part in the production of ascites.

1. *Obstruction to the Hepatic Venous Outflow Tract*: Occlusion of the portal vein will not produce ascites. Intrahepatic venous occlusion of the hepatic vein, or of the supradiaphragmatic portion of the inferior vena cava, will produce ascites. The ascites produced by supradiaphragmatic constriction of the inferior vena cava with aluminum bands in experimental animals, however, is associated with a low protein level, unlike human ascites due to portal cirrhosis.

Ascites can be produced in the dog by occlusion of the portal vein with simultaneous plasmapheresis. Such ascites is transient, and the protein content is low.

Hepatic lymph is greatly increased in cases of hepatic congestion, and the composition of this lymph is similar both to the serum in the hepatic capillaries and to ascitic fluid, suggesting that hepatic lymphatic exudate is the major factor in the production of ascites. Transplantation of the liver above the diaphragm in dogs subjected to inferior vena caval constriction produces thoracic "ascites" and the elimination of abdominal ascites.

2. *The Role of Colloidal Osmotic Pressure in the Production of Ascites*: The colloidal osmotic pressure is related (although not causally) to serum albumin concentration. The larger globulin molecule in the circulating blood plasma cannot pass the blood-vessel barrier and hence plays no part in the production or resolution of ascites.

Serum albumin arrives at an equilibrium with the albumin content of the extravasated ascitic albumin. This equilibrium is not altered significantly by the administration of human serum albumin to patients with cirrhosis and ascites. The serum albumin level of the blood will rise only transiently. In the cirrhotic animal, restriction of albumin will produce ascites (relieved by oral administration of protein). All of these facts are experimental and clinical evidence suggesting that ascites is not a simple transudate at the capillary level.

3. *Portal Hypertension*: Portal hypertension is present in about 50 per cent of cirrhotic patients and is probably due to intrahepatic obstruction (produced by distortion of the hepatic lobular architecture caused by fibrosis and regeneration) associated with an insufficient number of retroperitoneal venous collaterals. In these circumstances, portal pressure may vary from 250 to 600 mm. of saline solution, or even higher. Although portal hypertension is often associated with ascites, it is probably not a direct causative factor and ascites usually is not observed unless there is post-hepatic occlusion (i.e., in the hepatic vein as in the Budd-Chiari Syn-

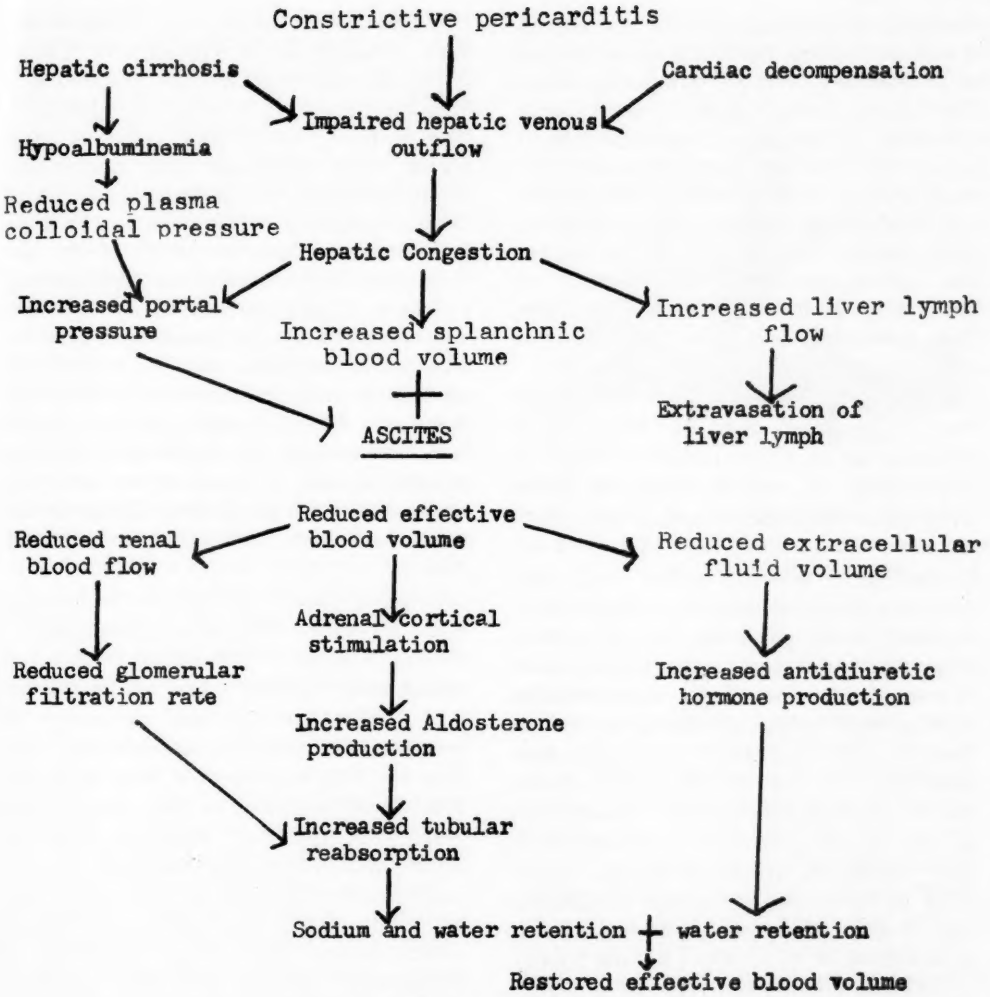

Fig. 1.—Pathogenesis of ascites.

drome) or unless there is sufficient parenchymal destruction to produce a reduction of serum albumin below 3 Gm. per hundred cubic centimeters.

4. *Sodium and Water Retention*: a. *Renal Factors.* Renal changes associated with cirrhosis are nonspecific and not well understood. Glomerular filtration may be normal, elevated or depressed. In most patients with ascites the tubular reabsorption of sodium is greatly increased, presumably owing to the stimulation of increased circulating aldosterone. This is apparently not related to the posterior pituitary hormone, although associated water retention, which occurs in ascites and is a generalized phenomenon, may well be subject to posterior pituitary mediation.

b. *Adrenal Factors.* Profuse diuresis results in adrenalectomized dogs or in human beings with ascites. Apparently

this is due to elimination of the mechanism of sodium tubular reabsorption as related to an elevated level of circulating blood aldosterone. Large doses of desoxycorticosterone acetate cause reaccumulation of ascitic fluid. Diuresis results when replacement therapy with cortisone (or preferably prednisone) for adrenalectomized patients can be reduced to 25 mg. or less per day. Large amounts of aldosterone are excreted in the urine of cirrhotic patients. This substance disappears in the urine after adrenalectomy.

c. *Posterior Pituitary Factors.* A direct effect is produced upon the renal tubule by posterior pituitary hormone, which is independent of sodium retention. Some cirrhotic patients retain water, but others respond with a normal diuresis, which can be suppressed with pitressin.

Medical Management.—1. *Restriction of Sodium Intake*: The key to the dietary home management of ascites is restriction of sodium, with concurrent administration of a protein intake as nearly normal as possible. Since all meat contains a high concentration of sodium, the sodium intake can be controlled easily and economically by the use of low-sodium powdered milk. Salt substitutes are available and can be used to flavor an otherwise unpalatable diet. Sodium intake should be restricted to a maximum of 20 m/Eq. (200 mg.) daily.

Unless ammonia intoxication is a problem, 100 to 120 Gm. of protein daily is helpful in treating cirrhotic ascites.

2. *Replacement of Serum Albumin*: This is an expensive and disappointing method of attempting to eliminate ascites and to elevate the serum albumin level. Normal serum albumin is high in salt content. Salt-poor albumin is extremely expensive and only transiently effective in elevating serum albumin levels; moreover, it exerts little or no effect upon the ascites that already exists.

3. *Synthetic Aldosterone Antagonists*: Such products as Amphenone 1,2-bis (p-aminopheny)-2-methyl propanone-1-dihydrochloride), will usually produce profuse diuresis; amphenone, however, is a highly toxic substance that may cause hepatic necrosis, and patients treated with it have a disconcerting tendency to lapse into hepatic coma. It is therefore not recommended for clinical use. Spirolactone [(3-(oxo-17 beta-hydroxy-19 nor-4 androsten-17 alpha-y) propionic acid gamma lactone] is less toxic and is a moderately promising medical adjuvant in the treatment of ascites. It causes profuse natruresis by blocking the tubular reabsorption of sodium, and it is probable that both amphenone and spirolactone act by inhibition of desoxycorticosterone and aldosterone.

4. *Synthetic Corticoids in Combination with Mercurial Diuretics*: These have a similar action in inhibiting DOCA and aldosterone. Twenty mg. of Prednisone will produce an effective elimination of sodium, particularly in combination with Mercuhydrin or Salyrgan. This is in contrast to the tendency of the natural corticoids to cause fluid retention. Diamox, Diuril and ammonium chloride have an unfortunate tendency to produce a precoma-like condition in the cirrhotic patient, which makes these drugs unsuitable as therapeutic agents for this condition. Cation exchange resins (e.g., carboresin, 15 Gm. three times daily, with meals) are moderately effective diuretics but may produce acidosis and hypokalemia.

5. *Vitamin B Complex, Choline and Other Lipotropic Agents*: These are given in large doses.

6. *Crude Liver Extract*: Intramuscular injection of crude liver extract has been advocated for some time in the treatment of advanced cirrhosis.

7. *Fresh Whole Blood*: This, stored in

plastic containers, should be used liberally to correct any refractory anemia. I am of two minds regarding the use of transfusions in the presence of cirrhosis. Homologous serum jaundice is a frequent sequel of blood transfusions in cirrhotic patients and can be a lethal complication; each additional transfusion increases the risk.

8. *Abdominal Paracentesis*: This should be used only in extreme embarrassment of digestion or circulation.

Complications of Medical Management.—These include the following conditions:

1. Hyponatremia, precipitated by rigid salt restriction during which an intercurrent infection may cause fever and diaphoresis or diarrhea, with increased loss of salt. The resultant vascular collapse may require treatment with intravenous hypertonic (5 per cent) saline solution.

2. Hypokalemia may be caused by hepatocellular failure, vomiting, diarrhea and/or treatment with carboresins. Potassium phosphate salts are excellent for replacement.

3. Ammonia intoxication is an ominous indication of advanced hepatic insufficiency and may be precipitated by any intestinal bleeding or by a high protein diet. It should be treated promptly by controlling the source of bleeding (if any), by limiting protein intake, by intestinal antiseptics and by intravenous Arginine.

Current Surgical Management of Ascites.—1. *Double Shunt* (Fig. 2): Combined hepatic and portal decompression, as described by McDermott and others, has considerable theoretical merit as a method of reducing or eliminating ascites. By the reduction of intrahepatic hypervolemia the associated lymphatic distention and the consequent extravasation are reduced or eliminated.

Intrahepatic vascular congestion is a striking feature of advanced portal cirrhosis and presumably is produced both by an inflammatory component of the disease itself and by obstruction to the outflow tract. The hepatic artery becomes enlarged to as much as three times its normal diameter, and potential or inactive arteriovenous shunts open up to burden further the already compromised portal circulation. Decompression of the hepatic end of the portal vein by double or side-to-side portacaval shunt will cause a reversal of blood flow, and not in the intrahepatic portal circulation alone; it probably introduces a significant arterial component into the inferior vena cava, which may bypass the intrahepatic capillary circulation completely. McDermott has reported successful results in a small series of cases with a brief follow-up period. In my own experience it is difficult to perform this operation successfully. Because of the ascites the structures in the gastrohepatic ligament are edematous, often hyperemic and adherent. A large caudate lobe may be a real obstacle; if present, it must be resected in order to perform the anastomosis, thus adding one more troublesome step to an already formidable operation. Even when a caudate lobe is not present, the portal vein is seldom long enough to enable

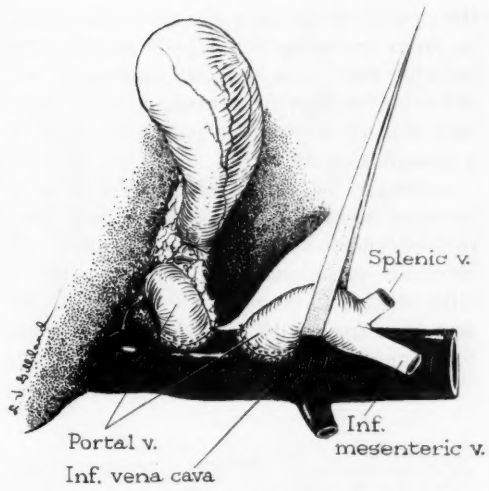

Fig. 2.—Double portacaval shunt.

the surgeon to divide it near its midportion in order to swing down both ends to the inferior vena cava without producing undesirable tension or extending the portal vein dissection into the pancreatic bed to a hazardous extent.

Although I do not recommend it as a primary operation for ascites, I have performed end-to-side portacaval shunts for bleeding esophageal varices in patients with incidental troublesome ascites, which was then gradually resolved within three to six months after the operation (Fig. 3).

2. *Side-to-Side Portacaval Shunt* (Fig. 4): This procedure has been advocated (by Longmire and Cutting, among others) as "more physiologic" than the end-to-side portacaval shunt and less likely to produce ammonia intoxication because it does not produce a complete hepatic bypass of the portal circulation. Actually, the direction of blood flow is probably uniformly away from the liver toward the area of lowest pressure—in other words, into the caval blood stream, where the intradiaphragmatic venous pressure is zero or even on the negative side. This creates the same hemodynamic situation that exists in the double portacaval shunt, except for the production of highly undesirable turbulence and eddy currents at the anastomotic site, which may result in thrombosis. In addition, a well-developed caudate lobe or vascular adhesions in the right upper quadrant, due to previous surgical maneuvers, may make the operation technically difficult or even impossible.

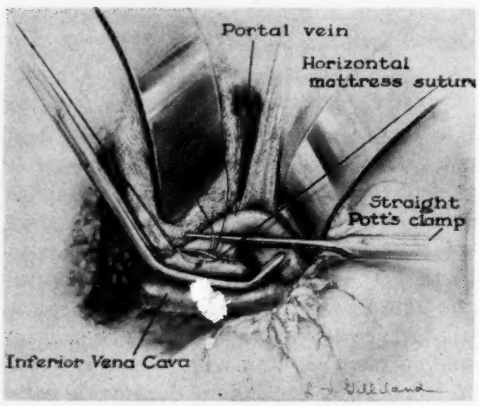

Fig. 3.—End-to-side portacaval shunt.

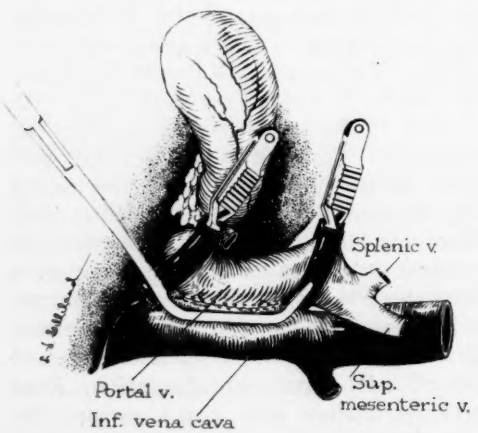

Fig. 4.—Side-to-side portacaval shunt.

In the presence of a pliable portal vein and in the absence of any significant adhesions or a large caudate lobe, this may be the easiest method of portal decompression. On the basis of some rather inconclusive studies by Longmire's group, it would appear that a small percentage of portal venous blood does enter the liver intermittently after side-to-side shunt, and there is a clinical impression among surgeons who favor this procedure that ammonia intoxication is less likely to develop after side-to-side than after end-to-side portacaval shunt. The incidence of troublesome incapacitating ammonia intoxication, however, is less than 5 per cent even after end-to-side shunt, and when this is balanced against the greater hazard of thrombosis in the side-to-side shunt, I favor complete division of the portal vein, particularly since satisfactory long-term management of episodic stupor with small doses of intestinal antiseptics has proved clinically feasible.

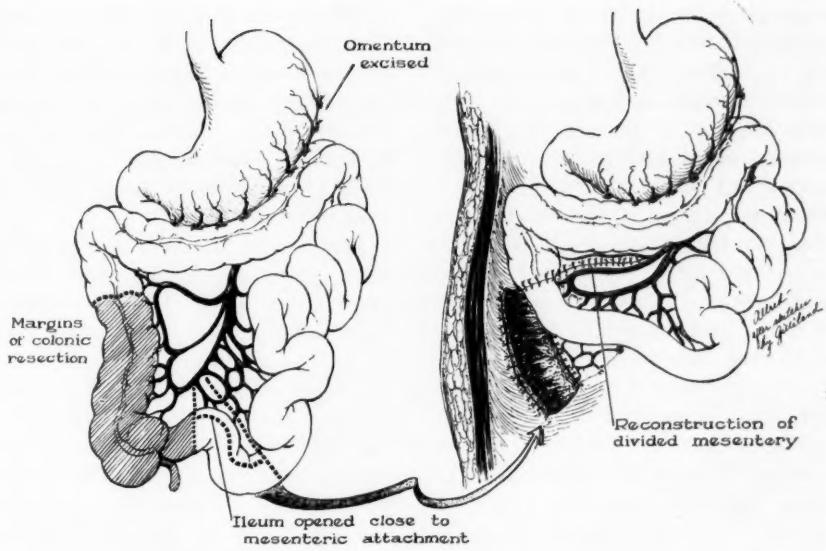
Omentum excised
Margins of colonic resection
Reconstruction of divided mesentery
Ileum opened close to mesenteric attachment

Fig. 5.—Ileoentectropy.

3. *Ileoentectropy* (Fig. 5): Ileal eversion, as developed by Neumann and Hinton, is an effective maneuver to produce reabsorption of ascitic fluid into the circulating blood stream. Briefly, the technic of the operation is as follows: The omentum, the cecum and the lower part of the right half of the colon are resected. A segment of terminal ileum approximately 18 to 20 cm. long is isolated, opened close to the mesenteric attachment and tacked to the lateral abdominal parietes in the location of the resected cecum and ascending colon. An ileo-ascending colostomy is then performed to restore intestinal continuity. Eversion of a segment of colon also produces efficient absorption of ascitic fluid but is accompanied by protracted and profuse extrusion of mucus into the peritoneal cavity.

Neumann and Hinton have performed modifications of this operation upon a small group of unselected cirrhotic patients with advanced ascites. The mortality rate in this series was 50 per cent, those who died being jaundiced or having bled from varices previously. For some unexplained reason, this operation appears to reactivate esophageal bleeding.

Judging by a very limited experience with this procedure at the institution I serve, it does appear to eliminate ascites. The production of intra-abdominal mucus, however, with resultant loculation and abscess formation, has been a protracted and troublesome complication.

4. *Bilateral Adrenalectomy* has been performed on man for intractable ascites by Giuseffi and Werk, among others. This procedure eliminates aldosterone production, producing profuse diuresis and natruresis. The surgical procedure, however, is one of some magnitude for a patient who is a poor risk, and some of the collaterals that may have developed between the adrenal, phrenic and splenic veins may be disturbed, with consequent troublesome or even dangerous bleeding at operation, and possibly disastrous postoperative elevation of portal pressure. In

the postoperative period one is faced with the management of two serious medical problems, i.e., adrenal and hepatic insufficiency. If the adrenal insufficiency is completely compensated by the administration of adequate steroid and by salt replacement, the ascites is apt to recur.

I have knowledge of 3 human subjects who have been adrenalectomized for ascites. One of these died of an asymptomatic perforated peptic ulcer during steroid therapy. The other 2 are still alive at the time of writing but present problems of medical management, wavering between decompensated hypoadrenalism and the reaccumulation of ascitic fluid.

5. *Subdiaphragmatic Transplantation of the Spleen*: Nylander and Turunen have transplanted the spleen supradiaphragmatically in a small series of patients, with resolution of ascites. This is a modification of the procedure developed by Holman in 1933, by which the spleen was transplanted into a lateral peritoneal pocket after ligation of the splenic artery in an attempt to reverse the blood flow in the splenic vein. I have had no experience with this procedure but am inclined to surmise that three possible hazards would be the development of thoracic ascites, splenic infarct and/or diaphragmatic hernia.

6. *Isolation of the Liver*: Consigning the liver to a separate abdominal compartment stems from the concept of the extravasation of hepatic lymph as the principal cause of ascites and from the experimental observation that supradiaphragmatic transplantation of the liver causes thoracic ascites and elimination of abdominal ascites. This technic is being developed currently and seems to afford some promise.

7. *Ligation of the Hepatic Artery* (Fig. 6) : Since the beginning of the antibiotic era it has become possible to avoid the lethal effects of ligation of the hepatic artery in the majority of cirrhotic patients by the use of massive doses of antibiotics. The mortality rate of this procedure among persons with normal livers still approaches 100 per cent, but for cirrhotic patients with hepatic hypervolemia and extensive intrahepatic arteriovenous shunts the survival rate should be well over 60 per cent.

Ligation of the hepatic artery as advocated by Rienhoff, Berman, McFadzean and others since the early 1950s, is a highly dangerous and controversial maneuver. Originally recommended as an emergency method of portal decompression in the presence of bleeding varices, the operation had some justification as a desperate remedy for a desperate situation. It soon became apparent, however (in addition to the mortality rate of 30 to 40 per cent), that ligation of the hepatic artery was a rather inefficient method of lowering portal pressure, the maximum pressure differential obtained being in the neighborhood of 100 to 110 mm. of water. In more recent years, therefore, it has been advocated chiefly as a method of treating ascites. It is claimed that if, on direct auscultation of the liver at the operating table, a bruit is present that can be eliminated by compression of the hepatic artery, ligation is safe to perform. I have had no personal experience with the application of this theory. It is my opinion that ligation of the hepatic artery is so unphysiologic and hazardous a procedure that it is to be recommended last among the operations currently employed for the relief of ascites. The operation is not easy in the presence of massive ascites with an edematous and adherent gastrohepatic ligament, a large, stony-hard liver, a greatly dilated hepatic artery, and a 20 per cent incidence of major arterial variations from the anatomic norm in this region. In order to be effective, the ligation must be distal to the "takeoff" of the gastroduodenal artery. As is shown in

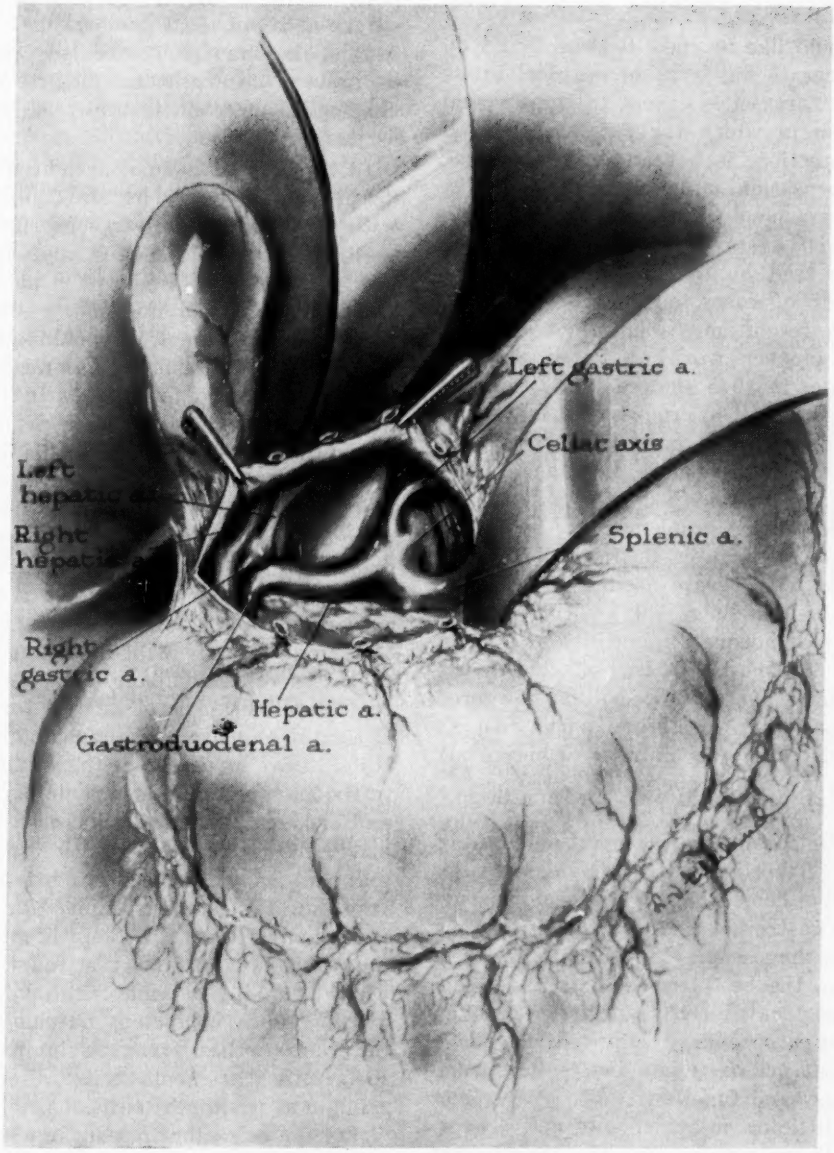

Fig. 6.—Ligation of hepatic artery.

Figure 6, however, this does not always eliminate the possibility of additional collaterals (in this case the right gastric artery). To achieve maximal portal decompression by this procedure, ligation of the splenic artery should be performed as well, particularly in the presence of splenomegaly.

COMMENT

I should like to make it clear that I do not advocate any type of surgical intervention for ascites except in the unusual situation in which the patient has good liver function, is not in chronic cardiac decompensation, is no longer an alcoholic, fails to respond to good medical management and has really troublesome symptoms caused by the ascites. In about 7 per cent of cases, cirrhotic ascites will undergo resolution without any treatment.

The pioneer work of Patek and his associates in 1948 showed that Laennec's cirrhosis is not a progressive, inevitably fatal disease. The cornerstones of good medical treatment are abstinence from alcohol, protracted bed rest and a well-rounded diet, supplemented by large amounts of vitamin B. In addition, for patients with severe ascites, drastic salt restriction (200 mg. daily) with the maintenance of adequate quantities of protein (40 to 60 Gm. daily), best effected by the administration of low-sodium powdered milk and an Aldosterone antagonist (Spirolactone), a diuretic (mercurial) plus a synthetic corticoid (Prednisone) are indicated.

If the patient *has* clear cut evidence of portal hypertension, as manifested by recurrent hemorrhage from the upper part of the gastrointestinal tract and roentgen and esophagoscopic evidence of esophageal varices, the best treatment is an end-to-side portacaval shunt, performed as an elective procedure, *if* the patient has a clear sensorium, *if* jaundice is absent and *if* biopsy and functional tests of the liver show little or no evidence of active hepatitis. If the patient also has troublesome and unrelenting ascites, an attempt should be made to construct a double portacaval shunt. If this is not feasible from the technical point of view, the end-to-side shunt may result in a remission of ascites in time, possibly owing to improved hepatic function incident to elimination of recurrent esophageal hemorrhage. To reiterate, the shunt is performed primarily to prevent recurrent esophageal hemorrhage and only incidentally to correct ascites.

In the very occasional patient who has not bled and is in good hepatic equilibrium, with no jaundice, a clear sensorium, and really troublesome ascites that impairs bodily function or hinders the patient in his occupation and does not respond to medical management, I should advocate one to three abdominal paracenteses* performed in the hospital, with the patient at bed rest and under strict aseptic precautions. Fluid intake should be curtailed drastically on the day preceding and the day following paracentesis, to prevent an acceleration of the expected drop in blood volume after paracentesis. This will occasionally produce a permanent remission of ascites. If this measure fails, as it usually will, it should be discarded, as repeated albumin-leaching paracentesis will often accelerate the formation of ascites, aggravate the hypoalbuminemic state, injure or perforate the small bowel, introduce infection and chronic peritonitis and produce a cutaneous ascitic fistula. If abdominal paracentesis is performed, the sediment should be centrifuged and the resulting cell block examined for malignant change. It must be kept in mind that many bizarre cells may be found in the ascitic fluid of patients with portal cirrhosis, but a competent pathologist can differentiate these from the clumps of true metastatic carcinoma cells observed in malignant peritoneal effusions.

For the refractory patient in whose case the internist and surgeon both consider operative relief necessary, one of the aforementioned procedures should be considered. In the absence of jaundice or a

*The protein concentration of ascitic fluid is approximately 2 Gr. per hundred cubic centimeters and the removal of each liter of ascitic fluid produces a loss of 20 Gm. of protein, which still further aggravates the albumin deficiency.

history of esophageal bleeding, ileoentectropy is the procedure of choice. In properly selected cases it is much less difficult and hazardous to perform than is the double portacaval shunt, although the latter is the only surgical procedure that will prevent the formation of ascites. As a distant third choice, supradiaphragmatic transplantation of the spleen may be considered. Bilateral adrenalectomy is apt to produce more trouble than it corrects, and isolation of the liver is still in an experimental state. If ligation of the hepatic artery is considered at all, it should be reserved for those cases in which an audible bruit is present on direct auscultation of the liver at operation.

SUMMARY

Laennec's cirrhosis is a reversible condition, responding well in many instances to good medical care and abstinence from alcohol.

Ascites is an exceedingly troublesome complication of late cirrhosis, produced by extravasation of hepatic lymph. Ascites can be produced by any condition causing obstruction of the supradiaphragmatic portion of the inferior vena cava and is only indirectly related to portal hypertension.

The treatment of cirrhotic ascites is primarily medical, consisting of abstinence from alcohol, bed rest, and a diet which is rich in vitamins, low in salt and including adequate protein. Aldosterone antagonists, mercurial diuretics and synthetic steroids may be useful adjuvants. Abdominal paracentesis should be reserved for special situations.

For the patient with truly unrelenting ascites producing severe symptoms, surgical intervention may have to be considered. Various operations are discussed and the following procedures recommended in order of preference: (1) ileoentectropy; (2) double portacaval shunt, and (3) supradiaphragmatic transplantation of the spleen.

RÉSUMÉ

La cirrhose de Laënnec est un état réversible, répondant bien, dans de nombreux cas, à un bon traitement médical et à l'abstinence de boissons alcooliques.

L'ascite est une complication extrêmement pénible de la cirrhose tardive provoquée par l'extravasation de la lymphe hépatique. L'ascite peut être provoquée par tout état causant une obstruction de la partie sus-diaphragmatique de la veine cave inférieure, et elle ne présente qu'un rapport indirect avec l'hypertension porte.

Le traitement de l'ascite cirrhotique est avant tout médical et consiste en l'abstinence de boissons alcooliques, repos alité, régime riche en vitamines, pauvre en sel, et comprenant des protéines en suffisance. Les antagonistes de l'aldostérone, les diurétiques mercuriels et les stéroïdes synthétiques peuvent être des adjuvants précieux. La ponction abdominale devrait être réservée à des cas spéciaux.

La chirurgie peut être envisagée dans les cas d'ascite irréversible. Différentes opérations sont discutées et les techniques suivantes sont recommandées par ordre préférentiel: 1) iléo-entectropie; 2) double dérivation porto-cave; 3) transplantation susdiaphragmatique de la rate.

ZUSAMMENFASSUNG

Die Laennecsche Zirrhose ist eine rückbildungsfähige Erkrankung, die in vielen Fällen auf gute medizinische Behandlung und Enthaltung vom Alkohol gut anspricht.

Der Aszites ist eine äusserst lästige Komplikation der vorgeschrittenen Zirrhose und entsteht durch Austritt von Leberlymphe. Er kann durch jede Erkrankung, die eine Verlagerung des oberhalb des Zwerchfell gelegenen Abschnittes der unteren Hohlvene verursacht, hervor-

gerufen werden und steht nur in indirekter Beziehung zum portalen Hochdruck.

Die Behandlung der zirrhotischen Bauchwassersucht ist in erster Linie medizinischer Art und besteht in Alkoholenthaltsamkeit, Bettruhe und in einer Diät, die reich an Vitaminen ist, wenig Salz und eine ausreichende Menge von Eiweiss enthält. Antagonisten des Aldosterons, quecksilberhaltige harntreibende Mittel und synthetische Steroide können sich als brauchbare Hilfsmittel erweisen. Die Punktion der Bauchhöhle sollte für besondere Situationen aufgespart bleiben.

Bei Kranken mit wirklich unerbittlichem zu schweren Symptomen führendem Aszites mag es nötig sein, chirurgische Massnahmen in Betracht zu ziehen. Verschiedene operative Methoden werden erörtert, und die folgenden Verfahren werden empfohlen und nach dem Grade ihrer Bevorzugung angeführt: 1) die Ileoentektropie, 2) die doppelte Seitenverbindung der Pfortader mit der Hohlvene und 3) die Verlagerung der Milz oberhalb des Zwerchfells.

RIASSUNTO

La cirrosi di Laennec è una malattia irreversibile, che tuttavia risponde bene, in certi casi, ad una opportuna terapia medica e alla abolizione degli alcoolici.

L'áscite è una grave complicazione della cirrosi nella sua fase tardiva, ed è causata da uno stravaso di linfa epatica. Essa può prodursi in qualunque caso di ostruzione della vena cava inferiore nel suo tratto sopradiaframmatico, ed è solo indirettamente in rapporto con l'ipertensione portale.

La cura dell'ascite cirrotica è prima di tutto medica, e consiste nella soppressione dell'alcool, nel riposo a letto e nella dieta ricca di vitamine, povera di sali e a sufficiente contenuto proteico. Gli antagonisti dell'aldosterone, i diuretici mercuriali e gli steroidi sintetici sono molto utili. La paracentesi addominale deve essere riservata ai casi speciali.

Nei malati con ascite veramente ingravescente e disturbi gravi si deve prendere in considerazione la possibilità della cura chirurgica. Discussi i vari procedimenti, vengono consigliati i seguenti, in ordine di preferenza: 1) ileo-entectropia; 2) doppio shunt porta-cava, e 3) trasposizione sopradiaframmatica della milza.

SUMARIO

A cirrose de Laennec é uma condição reversivel, respondendo bem em muitas ocasiões a bons cuidados médicos e abstinência alcoolica.

A ascite é uma complicação de cirrose antiga, produzida por extravasamento de linfa hepática. A ascite pode ser produzida por qualquer condição causando obstrução da porção supra-diafragmática da veia cava inferior e esta só indiretamente relacionada à hipertensão portal.

O tratamento da ascite cirrótica é primariamente médica, consistindo em abstinência alcoolica, repouso no leito e diéta rica em vitaminas, baixa em sal e incluindo quantidade adequada de proteinas. Antagonistas aldosteronicos, diuréticos mercuriais e (esteroides) e sintéticos podem ser adjuyantes uteis. A paracentése abdominal deve ser reservada para situações especiais.

Para o paciente com ascite verdadeiramente não regressiva, produzindo sintomas graves, a cirurgia deve ser levada em consideração. Discute varias operações e os procedimentos seguintes recomendados em ordem de preferencia: 1) ileo-entectropia; 2) dupla ligadura porto-cava e 3) transplante supra-diafragmático do baço.

RESUMEN

La cirrosis de Laennec es una afección reversible que en muchos casos responde bién a el tratamiento médico correcto y a la abstinencia de alcohol.

La escitis es una complicación muy molesta de la cirrosis tardía producida por la extravasación de la linfa hepática. La ascitis puede ser debida a cualquier causa de obstrucción de la porción supradiafragmática de la vena cava inferior y solo indirectamente está relacionada con la hipertensión portal.

El tratamiento de la cirrosis es ante todo médico y consiste en abstinencia de alcohol, reposo en cama y una dieta rica en vitaminas, pobre en sal y con suficiente cantidad de proteinas. Los antagonistas de la aldosterona, los diuréticos mercuriales y los esteroides sintéticos pueden ser buenos medios coadyuvantes. Solo en casos excepcionales debe recurrirse a la paracentesis.

En los casos de ascitis francamente rebelde y con síntomas graves debe tenerse en cuenta la cirugía. Se han propuesto diferentes intervenciones y los siguientes procedimientos se recomiendan en orden de preferencia: ileoentectropia; shunt portocaval doble y transplantación supradiafragmática del bazo.

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"The holy calm of being well dressed" is a phrase that has much wisdom in it. Good clothes minister to a mind diseased when nothing else can. I know of many women who have been cured of serious symptoms by going out and buying a new hat and dress. It is not any more expensive than going to the hospital and is often quite as efficacious.

—*Clendening*

Surgical Treatment of Cirrhotic Ascites with a New Operation (Pleuroperitoneostomy)

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ONE of the most difficult problems that face the surgeon is presented by the ascites that complicates hepatic cirrhosis. Once this complication appears, both the patient and the surgeon become anxious. Many attempts have been made by surgeons in different parts of the world, the multiplicity of which indicates that none of them is universally accepted as the key to the solution. Medical lines are similarly numerous, but they are beyond the scope of this paper. This is attributable, perhaps, to the fact that the mechanism of ascitic formation is not yet quite clear. Many factors are implicated to a smaller or greater degree, e.g., hypoproteinemia and especially hypoalbuminemia, portal hypertension, capillary hyperpermeability, hepatic congestion with subsequent lymph transudation, endocrine elements such as excessive antidiuretic substances as Ferritin, the vasodepressor factor of the lever which exerts antidiuretic action through the posterior pituitary, pitressin and antidiuretic hormone of the pituitary have all been considered to play a role in ascitic formation. Estrogens may play a minor role, owing to the inactivation of both exogenous and endogenous estrogens. Aldosterone and desoxycorticosterone, especially the former, are accumulated in cases of cirrhosis and lead to water and salt retention. An inflammatory and toxic element in the peritoneum would lead to ascitic formation.

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The different lines of treatment for cirrhogenic ascites by operation are summarized. The multiplicity of these indicates that none of them is a standard operation. The author describes a new operation, pleuroperitoneostony, in which the ascitic fluid is drained into the right pleural cavity through fenestration of the diaphragm, with the purpose of causing absorption of the fluid and reduction of the recurrence rate. The results, on the whole, are encouraging.

Surgical Technics Used for Relief of Cirrhogenic Ascites.—The different measures may be tabulated as follows.

A. Operation on the blood vessel to improve the linear circulation:

1. Ligature of the hepatic artery (Rienhoff[1])
2. Hepatic and splenic artery ligature (Moore and others;[2] Madden[3])
3. Ligature of the hepatic, splenic and left gastric arteries (Berman[4])
4. Ligature of the celiac artery (Wanke[5])
5. Splenectomy or ligature of the splenic artery (Moore and others[6])
6. Portosystemic shunt in any form, e.g., portacaval shunt (Eck,[6] Rosenstein,[7] Whipple,[8] Blackmore,[9] etc.); splenorenal shunt (Linton and Hardy[10]); superior mesentericorenal

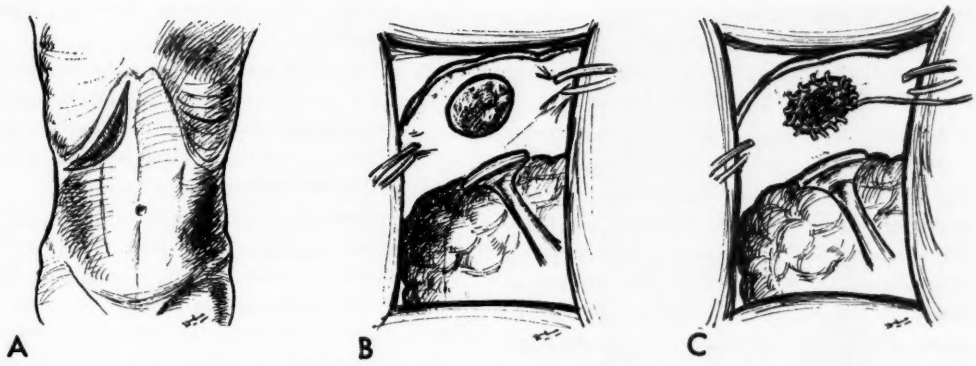

Fig. 1.—*A*, Kocher's incision. *B*, liver retracted down and fenestrum created in right cupola of diaphragm. *C*, opening in diaphragm encircled by running silk suture.

shunt (Shumacker and King[11]); inferior mesentericorenal shunt (Jianu[12] and Wanke[5]); inferior mesenterico-ovarian shunt (Villard and Tavernier[13]); superior mesentericocaval shunt (Bogarts,[14] Uglow[15] and others), portorenal shunt (Schröder[16]) and double portal shunt (McDermott[17]).

7. Arteriovenous (portohepatic) shunt (Saegresser[18])
8. Hepatic vascularization by aorticoportal graft (Bailey[19])
9. Ligation of the inferior mesenteric vein (Henrikson[20]).

B. Visceropexy:

1. Omentopexy, (Talma,[21] Drummond and Morison,[22] Kopf,[23] Schiassi[24])
2. Hepatopexy (Henrikson,[20] El-Toraei[25])
3. Spenopexy (Narath[26]).

C. Operations aiming at reduction of the ascitic of formation:

1. Resection of a good part of the small intestine (Laufman[27]).
2. Excision of patches of peritoneum (Cited by Skoryna[28]).

D. Operations for drainage of the ascitic fluid:

a. Internal drainage

1. Saphenoperitoneal drainage (Ruotte,[29] Bernheim,[30] Schnee[31])
2. Subcutaneous drainage (Crosby and Cooney[32])
3. Drainage into the cave of Retzius (Steinhart and Saexinger,[33] Paschold,[34] Stanley, Skoryna and others[28])
4. Drainage into the femoral canal (Handley[35])
5. Retroperitoneal drainage (Kalb,[36] Behan[37])
6. Coelioenterostomy (Staffaniak[38])
7. Intraosseous drainage (El-Toraei[25]).

b. External drainage

1. By a suprapubic cannula (Caille,[39] Magrath[40])
2. Through the urinary bladder (Rosenstein and Dziembowski,[41] Mulvany[42]).
3. Into the ureter after nephrectomy (Ferguson[43]).

E. Neurosurgical operations:

Celiac ganglionectomy and hepatic periarterial sympathectomy (Michoulier and others;[44] Mansouri and others[45]).

F. Operation on the bile ducts:

Ligation of the hepatic duct (Schalm,[46] Bax,[47] Leger[48]).

G. Endocrinectomy:

1. Bilateral adrenalectomy (Baronofsky and others,[49] Baronofsky and Canter,[50] Giuseffi and others[51])
2. Thyroidectomy (Canter and others[52])

Personal Experience.—I have been dealing with this problem since 1952; but my experience is with cases of hepatic bilharzial fibrosis, which is also called Egyptian splenomegaly, and this is the commonest cause of cirrhogenic ascites in Egypt. In cases of this type, however, the mechanism of ascitic formation does not seem to differ much from that associated with other types of hepatic cirrhosis. In 1956 I reported[53] on the surgical treatment of Egyptian splenomegaly as a whole, including some cases of ascites.

The measures used were as follows:

1. Saphenoperitoneal anastomosis was performed in 6 cases, with only temporary improvement one to four months.
2. Retroperitoneal drainage by excision of a part of the paracolic parietal peritoneum was used in 4 cases, with a better result, for periods ranging from six months to a year.
3. Intraosseous drainage. This a personal technic that was tried in 2 cases. In this operation an iliac incision is made, and the iliacus muscle is stripped from the iliac fossa especially high, near the iliac crest. Then the bone is gouged out to expose its spongiosa. Part of the posterior parietal peritoneum is removed, which causes the ascitic fluid to be drained retroperitoneally and through the spongiosa of the iliac bone. This operation gave satisfactory results in 1 of 2 cases; in the second there was mild improvement.

Fig. 2.—Patient before operation and more than one year later. Cure obtained.

4. Omentopexy, either alone or in conjunction with splenectomy, was used in 31 cases of early ascites. I was impressed by the result, since in nearly half of the cases there was no recurrence of the ascites for one to five years. In cases of the late ascites the result is not satisfactory.
5. Ligature of the hepatic artery was used in 7 cases. Four of the 7 patients died shortly after the operation because of cholemia. One showed moderate improvement. Two failed to improve, became cachectic and died one and three months after the operation. This operation, in my opinion, is not successful at least for the bilharzial type.
6. Hepatoxy: In 1 case the liver was fixed, with insufflation of talcum powder between it and the diaphragm, with only slight results.

A New Personal Technic (Pleuroperitoneostomy).—This technic aims at drainage of the ascitic fluid into the right pleural space, which I performed first in December 1958. The operation is based on the following grounds:

1. The pleura is so rich in lymphatics as to give the impression that there are direct stomas between the mesothelial plates of the pleura and the lymphatics. It is also known that dyes injected into the pleural cavity are rapidly absorbed, not only by the lymph routes but by the blood stream. Ostrowski injected 150 to 250 cc. of whole blood into the pleural sacs of dogs, and it was absorbed in three to six days. In 1 instance 40 cc. of 180 injected was absorbed in eight hours. Fat is also absorbed from the pleura (Bratiano and Bratianu). In addition, particulate matter is absorbed through phagocytosis effected by the pleural endothelium. Karsner and Swanbeck noted that the endothelium of the mediastinal pleura has the strongest activity, the pulmonary pleura next, then the diaphragmatic pleura; the costal pleura was least active. The lymph flow in the thoracic duct is cut down nearly half when pneumothorax is induced, showing that the respiratory movements are of great importance to pleural absorption. The nature of the fluid is also important; viz., the rate of absorption of proteinized exudates and transudates is in direct proportion to their protein concentration.

Fig. 3.—Stationary recurrent condition six months after operation.

Whole blood, on the other hand, disappears much more slowly than does dilute serum. These facts (Drinker and Jaffey[54]) are confirmed by my clinical observations

Fig. 4.—Patient before and five months after operation, showing recurrence less pronounced and scrotal swelling reduced.

in cases of pleural effusion and hemothorax.

2. Second, that hypoproteinemia presumably plays a significant role in ascitogenesis. This is confirmed not only by laboratory data but by my observations of cure in some cases after protein therapy, especially in cases of nutritional cirrhosis. Being unsatisfied with the results of many operations for ascitic patients and bearing these facts in mind, I started my operation of drainage of the ascites into the right pleural space by making an orifice in the right cupola of the diaphragm (a sort of fenestration). Selection of patients and preparation are highly important.

1. The age of the patient should be below 40 years. The patients operated on ranged from 12 to 40. Young patients stand the operation better.
2. The duration of the ascites should not be too long (maximum one to one and one-half years). Patients in very late stages are unsuitable.
3. There should be no infection or neoplasia in the peritoneal fluid.
4. The general condition should not be poor. Hepatic, renal and cardiopulmonary functions should not be failing. Electrocardiographic studies are done as a routine, and the vital capacity should not be less than 2,500 cc.
5. Medical treatment should be added (tonics, lipotropes, diuretics, etc.).

Technic:—Before the operation I tap a good amount of the fluid, in order to increase the vital capacity so that the

Fig. 5.—Advanced condition somewhat improved after operation.

Fig. 6.—Another patient improved but not cured.

anesthetist will be at ease. A few days before the operation a right pneumothorax is induced to test the patient's capacity and to prevent sudden collapse of the lung on opening the diaphragm. Anesthesia is induced with gas plus oxygen plus a muscle relaxant, with controlled respiration. In a few cases I have used cyclopropane. Ether should not be employed, nor should barbiturates. An intravenous infusion of 5 per cent dextrose or human plasma is given by the drip method.

The incision is (Kocher's) right subcostal. The ascitic overflow is aspirated. The liver is retracted downward. The right leaflet of the diaphragm is held by four tissue forceps near its highest and posteriormost part. A disc of the whole thickness of the diaphragm is removed. The pleural and peritoneal cavities are thus interconnected by means of an orifice in the diaphragm, 3 to 4 inches (7.5 to 10 cm.) in diameter. The edge of the defect in the diaphragm is run over with a continuous silk suture for hemostasis. The ascitic fluid is caused to trickle into the chest by tilting the head of the table downward. The abdominal wound is closed, and before the last stitch is tied the air is expelled through a rubber tube (Fig. 1, *A*, *B* and *C*).

After the operation, oxygen is given by the B.L.B. mask or nasal catheters. Fluids are given with care to prevent pulmonary edema. Hepatic, cardiac and renal supports are necessary.

Antibiotics and all vitamins are prescribed. The patient is kept in the Trendelenburg position as long as possible. Diuretics are given orally (Diamox, Chlotride or Esidrex), or Mersalyl intramuscularly or Esidrone intraperitoneally.

Results.—Eighteen patients were operated upon, the first twenty months and

the last one month prior to the time of writing. There was only 1 operative death, that of a woman age 32 who died on the table owing to sudden mediastinal shift. This occurred before I began to induce preoperative pneumothorax (mortality rate, 5.5 per cent). One patient died 36 hours after the operation from cardiac failure, a man age 21. He showed severe tachycardia and high blood pressure and then collapsed. A third patient died eleven days after the operation owing to cholemia and jaundice. Of the surviving 15 patients, 3 were completely cured, with no recurrence of the ascites; 2 have survived fifteen and thirteen months respectively, and 1 after six months of massive esophageal hemorrhage.

In 1 case there was moderate recurrence, but the ascites disappeared spontaneously without tapping and has been nonexistent for nine months. Six patients showed much improvement, but had moderate ascites, not embarrassing and not to be tapped. Three showed mild improvement, with recurrence of the ascites, but not as quickly as before the operation. The last 2 showed some improvement, but it is too early to judge, as only one month has elapsed since they were operated upon (Figs. 2 to 6*A*, inclusive). Laboratory data in detail will be presented later.

Postoperative Observations.—1. The general condition as well as the psychic state showed a mild or moderate improvement. Two patients whose ascites disappeared, 1 a student and the other

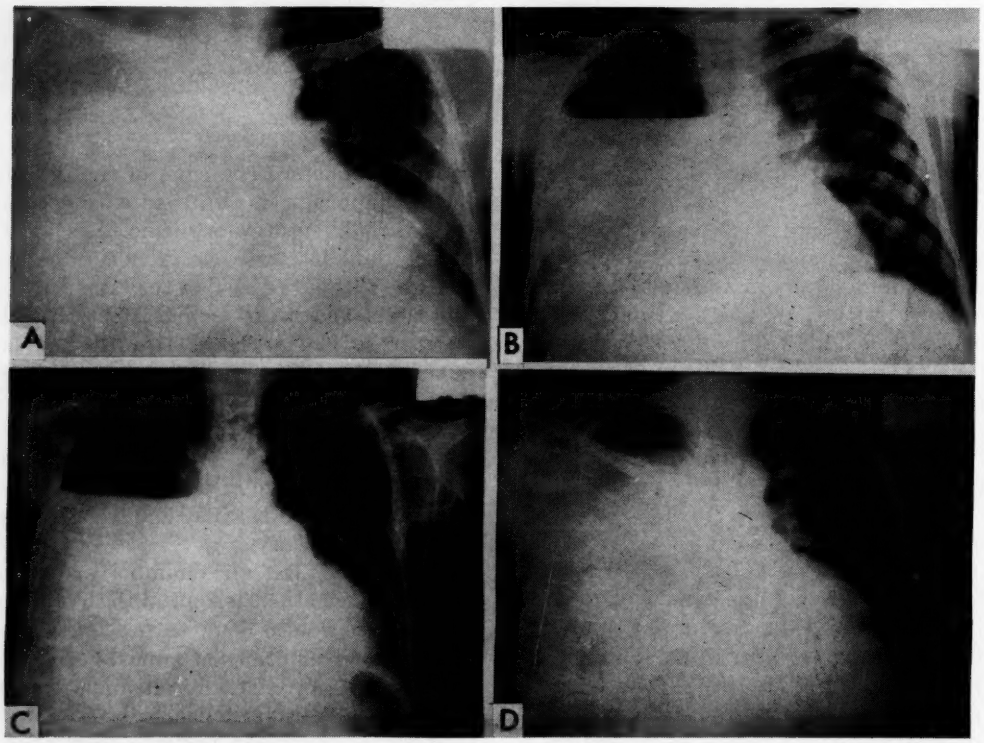

Fig. 7.—*A*, roentgenogram taken shortly after operation. *B*, another film taken two weeks after operation. *C*, hydropneumothorax after operation. *D*, roentgenogram taken some months after operation.

a peasant, are carrying out their jobs normally.

2. The function of the liver was either unchanged (4 cases) or improved to a mild degree. One patient died of cholemia.

3. The blood protein level was invariably increased in those cases in which a good response was obtained.

4. Diuretics became more effective; in most of the cases when Mersalyl or Esidrone was used, the output of urine was increased by 600 to 1,200 cc. of urine over that observed before the operation.

5. Phenolphthalein was injected intraperitoneally, and the rate of its excretion in the urine was accelerated after the operation.

6. The opening or fenestrum created in the diaphragm remained patent in all cases as tested roentgenographically after injection of air or by taking a film with the patient in the high Trendelenburg position.

7. No diaphragmatic hernia developed; the opening was protected by the liver.

8. The hydrothorax was present for a long time after the operation, gradually shrinking to a greater or lesser degree, depending on the result (Fig. 6, *B*, *C* and *D*).

9. Vital capacity was reduced after the operation to one-half or two-thirds depending on the hydrothorax.

A radioactive tracing of the ascitic fluid is being studied, and detailed results will be given later.

ZUSAMMENFASSUNG

Der Verfasser gibt einen Überblick über die verschiedenen chirurgischen Behandlungsverfahren der durch Leberzirrhose entstandenen Bauchwassersucht. Ihre grosse Zahl lässt erkennen, dass keine von ihnen sich als Standardsmethode durchgesetzt hat. Der Verfasser beschreibt eine neue Operation, nämlich die Pleuroperitonaostomie, wobei die Aszitesflüssigkeit durch eine Fensterung des Zwerchfells in die Pleurahöhle abgeleitet wird in dem Bestreben, die Flüssigkeit zur Absorption zu bringen und die Geschwindigkeit ihres Wiederauftretens herabzusetzen. Die Erfolge sind im grossen und ganzen ermutigend.

RÉSUMÉ

Les diverses méthodes chirurgicales de l'ascite cirrhotique sont résumés. Leur multiplicité indique qu'aucune d'elles n'est l'opération standard.

L'auteur décrit une nouvelle opération, la pleuropéritonéostomie, dans laquelle le liquide ascitique est drainé dans la cavité pleurale droite par une fénestration du diaphragme, afin de provoquer l'absorption du liquide et d'abaisser le taux des rócidives. Dans leur ensemble, les résultats sont encourageants.

RESUMEN

En este artículo se señalan las posibilidades de tratamiento quirúrgico de la ascitis de origen cirrótico y las diferentes técnicas ensayadas hasta ahora que no han llegado a dar con una operación de elección. Aquí el autor describe una nueva operación que consiste en practicar una pleuroperitoneostomía para que parte del líquido ascítico pase a la cavidad pleural a través de una ventana diafragmática practicada en el lado derecho y se amplíe la superficie de reabsorción, con lo que además habría menos recurrencias.

Los resultados obtenidos hasta ahora son alentadores.

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Maimonides (Musa ibn Maimun, Rabbi Moses ben Maimon) was born of a prominent Hebrew family, March 30, 1135, in the city of Cordova.

The boy, who loved to play in the narrow sun-baked streets and stared spellbound at the water flowing from bronze and silver statues into marble troughs, was educated by his father in the Talmud and the Bible, law and science, astronomy and literature. When the intolerant *almohades* occupied Cordova, Maimonides had to flee to Fez where, together with his father, brother, and sister, he pretended to embrace Islam. Later, Maimonides went with his father and his brother to Jerusalem and from there to Cairo where, after his father's death, he became a dealer in jewelry . . .

Maimonides became personal physician to the Sultan Saladin, the first Ayyubite sultan of Egypt (1138-1193), a living symbol of Mohammedan unity. The caliphs of Baghdad had then only nominal power; the viziers were the real rulers. One day there arrived in Acre a powerful-looking Englishman wearing a glittering coat of mail and an enormous sword. It was Richard I of England, the Lion-Hearted, who tried unsuccessfully to acquire Maimonides' services for his own court. But Maimonides had the Egyptian sun to remind him of his beloved Cordova and he refused to exchange it for the mysterious fogs of England.

Maimonides would work until the afternoon in the royal palace; then, tired and hungry, he would return home, have some dates, figs, grapes, and fowl, drink the watered wine from his silver cup, and go back to his consultations with Moorish and Hebrew patients. Only Saturdays did he set aside for studying and writing. Sometimes his pen would remain suspended in mid-air while he went into a trance, dreaming of the olive, orange, and lemon groves that perfumed the Cordovan hills under a brilliant blue sky.

Maimonides lived this sort of life to the very end. He preferred to regard medicine as an art, not as a science; he studied the sick, not sickness; and his actions and thoughts were guided by that teleologic criterion which today governs modern medicine.

—*Marti-Ibañez*

Absorption of Ascitic Fluid by Intestinal Entectropy

An Experimental Study

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AND
N. GEORGIADES, M.D.

ATHENS, GREECE

THE effectiveness of shunting procedures for the control of bleeding esophageal varices is now well established. Their effect in the treatment of ascites, however, is questionable.

Side-to-side portocaval anastomosis, in some cases, prevents further production of ascitic fluid, but not infrequently this procedure, when performed in an ascitic patient, is accompanied by acute hepatic necrosis.

Neumann[1] was the first to utilize the mucosa of the terminal portion of the ileum for the absorption of ascitic fluid. His results were good.

For this procedure he introduced the term "ileoentectropy," i.e., eversion of a segment of the intestine. The technical details of the operation are well known from Neumann's own publications.

We should like to state here that in our cases we did not find it necessary to perform right colectomy or gastrostomy, and instead of Neumann's omentectomy we plicated and fixed the omentum on the transverse portion of the colon.

Our experience is based on an experimental study of 50 dogs, followed by operations in 2 clinical cases.

Ascites was induced to the animals by partial ligation of the inferior vena cava above the diaphragm (Fig. 1). In 40 of the dogs complete absorption of ascitic fluid was obtained by a typical ileoentectropy. In the remaining 10, instead of the ileum, the right colon was everted, and the results were similarly good.

In those cases in which the colon was used, however, there was overproduction of mucus in the abdominal cavity. We therefore discontinued using the colon for eversion.

In the 2 clinical cases ileoentectropy was performed, first on a boy 11 years old and second on a woman aged 56. Both patients presented ascites due to cirrhosis of the liver, confirmed by histologic examination, and there was no jaundice. Esophageal varices were not present.

The operation was a typical ileoentectropy, with eversion of a 20 cm. segment of the terminal portion of the ileum and

From the First Surgical Clinic of the University of Athens, Prof. N. Christeas, Director.
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The authors' experience with "ileoentectropy," involving experimental work on 50 ascitic dogs and clinical work in the cases of 2 ascitic patients, is described.

The route of absorption of ascitic fluid by the mucosa of an inverted segment of ileum was experimentally investigated, with measurements of lymph flow and the use of radioisotope technics.

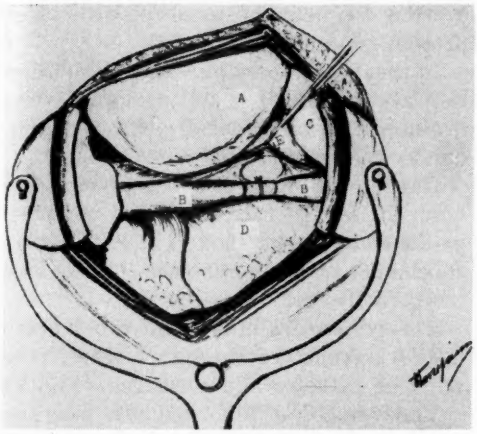

Fig. 1.—Partial ligation of inferior vena cava above diaphragm. *A*, heart; *B*, inferior vena cava; *C*, lung; *D*, diaphragm; *E*, phrenic nerve.

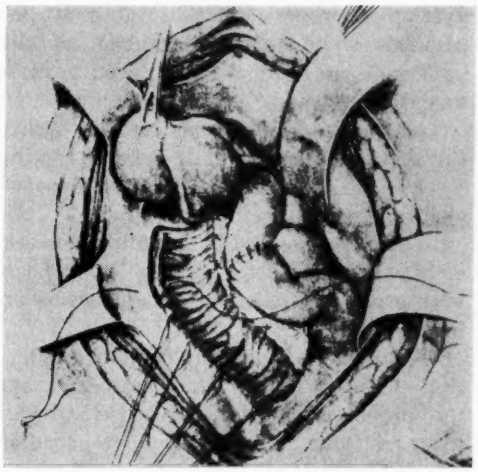

Fig. 2.—Typical "ileoentectropy."

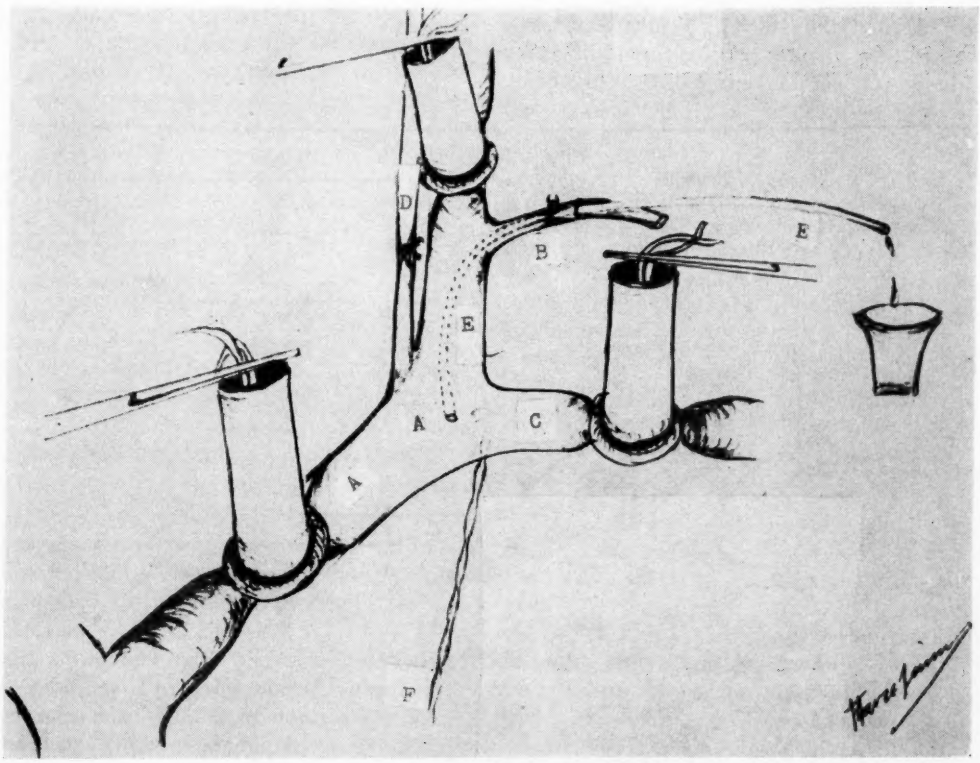

Fig. 3.—Measurement of lymph flow. *A*, innominate vein; *B*, subclavian vein; *C*, external jugular vein; *D*, internal jugular vein; *E*, polyethylene catheter; *F*, thoracic duct.

fixation of this segment on the lateral parietal peritoneum. Restoration of the intestinal continuity was achieved by end-to-end anastomosis (Fig. 2).

The follow-up period has been two years for the first case and four months for the second, and the results at the time of writing are satisfactory.

In our opinion, Neumann's operation is indicated in cases of hepatic cirrhosis with pronounced ascites but without bleeding or jaundice.

As far as we know, the route of absorption of ascitic fluid has not yet been made the subject of experimental work. In order to investigate this problem, we studied experimentally (1) the route of eventual circulation of water and electrolytes during their absorption after ileoentectropy, and (2) the ability of the mucosa of the everted segment of intestine to absorb protein molecules.

In theory, the possible routes of absorption are (1) the parietal collateral veins draining into the superior vena cave and/or (2) the lymphatics.

During our investigation the lymph flow from the left thoracic duct was measured by the following method: The left jugular, subclavian and innominate veins were temporarily occluded.

The lymph draining from the thoracic duct was collected through a small polyethylene catheter and measured (Fig. 3).

The lymph flow in normal dogs weighing 15 Kg. was 0.35 ml. per minute, i.e., 400 to 500 ml. per twenty-four hours. When experimental ascites was induced, the lymph flow increased to 0.63 ml. per minute (900 ml. per twenty-four hours, and

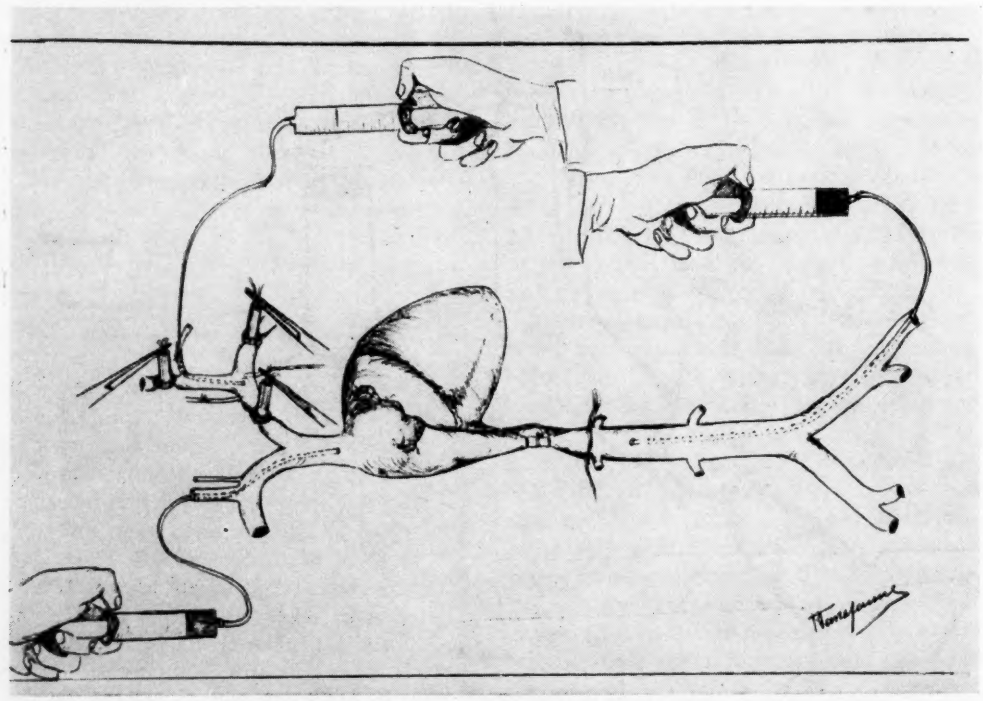

Fig. 4.—Collection of test samples from thoracic duct and superior and inferior venae cavae.

after "ileoentectropy" it reached a level of 1 to 2 ml. per minute, or 3,000 ml. in twenty-four hours.

By the use of radioactive isotopes even more accurate measurements were obtained. For this purpose radioactive phosphorus (P_{32}) and labeled protein (RISA) were used.

The radioactive material was administered by intraperitoneal injection to the dogs with ascities and after ileoentectropy. Samples of lymph and blood were collected simultaneously ten, twenty, and thirty minutes after the injection.

The lymph was collected in the aforementioned way. Samples of blood were also taken, after catheterization, from the superior vena cava and the inferior vena cava at the level of the hepatic veins (Fig. 4).

The accompanying table indicates our observations on the manner in which radioactive phosphorus and labeled protein are absorbed.

*Absorption of Radioactive Phosphorus (P_{32}) and Protein**

Route of Absorption	P_{32}	(RISA) *Labeled Protein*
Lymph	148 c/s	7.65 c/s
Superior vena cava	53 c/s	2.40 c/s
Inferior vena cava	27.8 c/s	1.40 c/s

*Samples taken thirty minutes after injection.

From the above measurements it is evident that (a) the absorption of ascitic fluid takes place mainly through lymphatic channels and (b) that absorption of protein molecules *does* occur through the mucosa of the inverted segment of terminal ileum.

In agreement with the aforementioned observations is also the fact of the restoration of serum protein to normal levels as observed in our experimental and clinical work.

We may therefore reasonably conclude that ileoentectropy is a valuable procedure in the management of intractable ascites due to hepatic cirrhosis. Furthermore, time is given to the liver to regenerate.

Authors' Note: Sincere appreciation is expressed to Prof. B. Malamos and the staff of the Radio-Isotopes Laboratory, Therapeutical Clinic, University of Athens; Mrs. S. Kamvysis, Chief of the Department of Anaesthesiology; Miss H. Partheniou, for biochemistry analyses; Drs. A. Perimenis, J. Poulantzas, E. Lamprinopoulos and K. Pantelakis, for assistance in the animal laboratory, and Dr. K. Pantelakis, for the drawings.

ZUSAMMENFASSUNG

Es wird über Erfahrungen mit der Auswärtskehrung des Dünndarms an 50 Versuchshunden und an zwei klinischen Patienten mit Aszites berichtet.

Der Weg der Absorbierung der Aszitesflüssigkeit durch die Schleimhaut eines umgestülpten Ileumabschnittes wurde experimentell untersucht. Der Lymphabfluss wurde mit Hilfe radioaktiver Isotope gemessen.

RIASSUNTO

Viene descritta l'esperienza dell'autore sulla "ileo-entectropia," che é stata provata sia sperimentalmente su 50 cani con ascite sia clinicamente su 2 pazienti ascitici.

Sono state condotte ricerche sulla via di riassorbimento del liquido ascitico da parte della mucosa di un'ansa ileale rovesciata misurando il flusso linfatico e per mezzo di radioisotopi.

RESUMEN

El autor se refiere a su experiencia con "ilio-enteroctropia" dereivada de la observación en dos enfermos y en cincuanta perros de experimentación.

Se ha investigado experimentalmente la ruta de absorción del líquido ascítico por la mucosa de un segmento de ileon invertido controlado el flujo linfático por medio de radio-isótopos.

RÉSUMÉ

Les auteurs décrivent leur expérience de l'iléo-entectropie," qui comprend un travail expérimental sur 50 chiens ascitiques, et les observations cliniques de deux cas de malades ascitiques.

La voie d'absorption du liquide ascitique par la muqueuse d'un segment inversé de l'iléon a été étudiée expérimentalment, avec des mesures du liquide lymphatique et l'utilisation de techniques radio-isotopes.

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All members of the International College of Surgeons who wish to receive copies of the papers that were delivered at the Rome meeting in May, 1960, may do so by requesting the papers of the specialty in which they are interested. The papers are bound in separate volumes according to specialty. The specialties covered are general surgery, neurosurgery, orthopedics, colonic surgery, proctology, ophthalmology, otolaryngology, obstetrics and gynecology, rehabilitation, traumatic surgery, cardiac surgery, pediatrics, urology, plastic surgery, thoracic surgery, anesthesiology and surgical nursing.

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H. E. Turner, M.D.
Secretary General
International College of Surgeons

Inguinal Hernia

A Survey of Nine Hundred and Seventy-Seven Cases

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BOSTON, MASSACHUSETTS

After a brief historical review of the various types of inguinal hernia and their treatment, the authors describe the causes, symptoms and differential diagnosis. Various technics of operative repair are discussed, with their anatomic bases. Finally, a statistical analysis of 977 cases is presented and correlated with the patient's age, the type of hernia, operative management, postoperative conditions, complications and recurrence, with results similar to those reported in other studies. The diversified and sometimes conflicting opinions with regard to inguinal hernia are emphasized.

AN abdominal hernia is defined by McVay[1] as "a defect in the normal musculo-aponeurotic and fascial continuity of the abdominal wall (respiratory or pelvic diaphragms), either congenital or acquired, which permits the egress of any structures other than those which normally pass through the parieties." This is probably as good a definition of abdominal hernia as can be found, for it takes into account the fact that the herniated material need not be a viscus but may be composed of properitoneal fat, congenital processus vaginalis or any one of a large number of other structures.

That man is an upright animal who possesses an anterior abdominal wall better suited to a four-footed creature serves to explain why the lower margin of the wall, at its juncture with the pelvis and the lower extremities, is the most common site for the development of hernial protrusions. This paper will discuss two types of inguinal hernia, direct and indirect.

Historical Notes.—Inguinal hernia presents a problem that has perplexed man for centuries. Although the presence of an abnormal mass in the groin is often easily observable, it was not until 1888 that a satisfactory method of repairing the damaged abdominal wall was available. In that year Bassini, an Italian surgeon, devised a successful operation for reducing the hernial sac and for repairing the inguinal canal area. Although this was the first widely adopted procedure of its kind, McVay has noted that credit for the first satisfactory operation belongs to an American, H. O. Marcy. It was also about this time that Halsted, an American, developed a technic he subsequently abandoned for one essentially similar to the Bassini procedure. The first operation became known as the Halsted I operation, and its modification became the Halsted II. The third of the classic operations for hernia was described in 1899 and is known as the Ferguson procedure. McVay noted that the identical operation had been outlined many years before by Bull and Coley,

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but it was Ferguson who first perfected and popularized it. Andrews became the first American to recommend imbrication of the external oblique fascia, although a Frenchman, Championniere, described this first in 1892.[1]

The fourth decade of the twentieth century saw many significant advances in the technic of inguinal hernia repair. Whereas McVay, in 1938, based a method of repair on the use of Cooper's ligament as an anchoring structure, Fallis, in 1939, stressed the importance of the transversalis fascia as one of the bulwarks of the posterior inguinal wall.[1]

The history of the various materials employed in hernia repair is very complex. In 1921, Gallie first described methods involving viable fascial sutures. Since that time many investigators have reported on silk, cotton, wire and other such materials. Metallic mesh as a basis of reinforcement for a seriously damaged posterior inguinal wall was advocated by Jefferson, while the use of skin grafts for the same purpose was described by Chodoff.[2]

Etiologic and Pathogenic Factors.—For the purpose of this paper, only direct and indirect inguinal hernia will be considered. It must be kept in mind that even though these two types of hernia are discussed as distinct entities, they frequently appear clinically in combined forms.

Direct Hernia: A. H. Iason,[3] in an excellent article on direct inguinal hernia, postulated several possible causes. That direct hernias often occur in persons with increased intra-abdominal pressure as a result of heavy physical effort is a well-accepted fact.

Another factor commonly implicated as a cause of direct hernia is atrophy of the abdominal musculature from advanced age or a wasting disease. Such conditions as obesity and ascites serve to increase the size and weight of the intra-abdominal contents. Chronic cough, which results in a sudden increase in intra-abdominal pressure, is also a common etiologic agent. Most workers interested in this field seem convinced that a sudden spasmodic increase in the forces acting on the posterior inguinal wall, notably such factors as the lifting of heavy weights or spasms of intense coughing, are more likely to cause weakening of the wall and subsequent hernia formation than is the prolonged type of pressure. Such prolonged pressure as is associated with chronic constipation, rectal carcinoma or stricture and urethral stricture, however, may also be important etiologic factors. Another frequent cause of direct hernia is the insufficient or unwise repair of an external hernia. With all these factors in mind, there seems to be a discrepancy in the literature as regards the etiology. In the opinion of Iason,[3] all direct hernias are acquired, and, although all these other factors are important and do appear frequently, it is a poorly developed abdominal musculature with subsequent weakening of subjacent structures that is the most common factor in the development of this condition. McVay,[1] on the other hand, expressed the opinion that heredity is the most important factor, referring to it as a congenital predisposition. He stated that persons with visceroptosis are perfect candidates for this condition and that in such persons varicose veins and hemorrhoids also tend to develop—a fact suggesting that they have a generalized weakening of their connective tissues. Nichols[4] noted that trauma to the anterior abdominal wall is also, at times, a crucial factor. In his paper on this subject he cites patients in whom hernia developed as a direct result of falls in which they landed on their lower extremities, thus jarring the abdominal contents against the posterior inguinal wall.

The direct type of hernia always enters

the inguinal canal medial to the inferior epigastric artery. In most cases the artery and the spermatic cord are contiguous to the lateral aspect of the sac. Iason[3] stated that frequently the inferior margin of the internal oblique muscle and its insertion are deficient, and that this brings about a situation in which the muscle is inserted too far from its normal point of insertion on the pubis. This configuration results in the formation of a triangle bounded by the inguinal ligament, the internal oblique and the lateral border of the rectus. The lateral angle of this triangle lacks a conjoined tendon and contains no substitute for it.

Since a direct hernia may pass through this point and into the canal, a weak or deficient conjoined tendon is therefore implicated as a common cause of inguinal hernia. Iason[3] considered two varieties of direct hernia. In the first, either a bulge forms in the medial inguinal fossa and penetrates the conjoined tendon (which is in the medial two-thirds of the inguinal triangle), or it may push the tendon anteriorly and penetrate the lower end of the canal. In the second form the protrusion penetrates the middle inguinal fossa and appears in the lateral third of the triangle, thus penetrating the upper part of the inguinal canal. The type of direct inguinal hernia most frequently encountered is more or less a slow stretching of an intact but weak transversus abdominis aponeurosis. As the hernial protrusion becomes larger, the fibers of the aponeurosis are stretched further apart, the fascial layer thus being stretched but still maintaining the continuity of its wall. When the aponeurosis fails to hold back the developing hernia, which therefore bulges forward, the internal oblique becomes stretched and is moved. The spermatic cord remains below the bulge of the hernia because the fascial connection between the inferior margin of the internal oblique and the cremasteric muscle has been broken.

It is important to realize that a weak internal oblique aponeurosis may delay the development of a hernia but will not prevent it. If this layer is strong and intact, no hernia will develop, regardless of the presence of a weakened overlying musculature. Thus, a crucial factor in hernial development is the presence of a weak transversus abdominis aponeurosis, together with its fascial investment.

As the hernia passes from the abdomen outward it picks up a number of neighboring structures, which combine to make up its final composition. In the abdomen it acquires peritoneal, areolar and transversalis aponeurosis tissue. As it passes to the lower end of the inguinal canal, the conjoined tendon and the reflected inguinal ligament make their contributions. It picks up the external spermatic fascia at the subcutaneous inguinal ring and adds superficial fascia and skin in the scrotum. In addition to these, if it enters the upper part of the canal, it picks up properitoneal fat and cremasteric muscle fibers. Thus the direct hernia has the same covering as the indirect hernia, except that the conjoined tendon is substituted for the cremasteric fascia and the transversalis for the infundibulum.

Indirect Hernia: An indirect inguinal hernia traverses the abdominal inguinal ring, follows the spermatic cord down the inguinal canal and penetrates the subcutaneous inguinal ring into the scrotum. The hernia may be very small and confined completely to the inguinal canal, or it may be very large, massively involving the scrotum on one side. In contradistinction to the factors that cause direct inguinal hernia, those that cause the indirect types are more clearly congenital in origin. It is a generally accepted rule that in almost all cases of indirect hernia there is a congenital peritoneal pouch that passes through the abdominal ring, and into the inguinal canal—a pouch that exists be-

cause of failure of obliteration of the processus vaginalis after the descent of the testis (or fixation of the ovary). The mere presence of this peritoneal sac, however, does not necessarily mean that an indirect hernia will form, for factors that bring about an increased intra-abdominal pressure great enough to force intra-abdominal contents into the waiting sac must be present. These factors, which have already been discussed, are probably the same as those operating in the formation of direct hernia. According to McVay,[1] this type of hernia is the most prevalent of all. He stated that 60 per cent of all hernias and 80 per cent of hernias of the groin are of the indirect inguinal type. The hernia is ten times as common in the male as in the female. For purposes of description, McVay[1] classifies indirect inguinal hernias into three types, using the diameter of the abdominal inguinal ring as the variable. A small indirect inguinal hernia reveals only slight dilatation of the deep ring, the length of the sac again having no relation to the extent of the hernia. Thus, the presence of a peritoneal sac and slight dilatation of the abdominal ring represent the only deviation from the normal anatomic picture in this region. With this fact in mind, it should be easy to see why the repair of this type of hernia is not difficult. Medium and large hernias are differentiated anatomically by a line drawn cephalad from the femoral ring. If the medial margin of the dilated ring crosses this line, the hernia is treated as a large indirect hernia; if it does not, it is considered a medium-sized one. It must be kept in mind that, for the most part, an indirect hernia becomes enlarged medially, and that a large one may extend to the lateral margin of the rectus sheath. In the medium-sized hernia, the conformity of the transversalis aponeurosis with the anterior femoral sheath is completely destroyed, but the posterior inguinal wall and its insertion into Cooper's ligament remain intact. The middle-sized indirect hernia is commonly complicated by pedunculated properitoneal fat pads within the structures that compose the spermatic cord and is often complicated also by sliding hernia, a subject to be discussed later. The large indirect hernia takes a good deal of time to develop and is therefore observed in persons who do not seek the advice of a physician at the time of the first appearance of a bulge in the groin.

With this type, as with all other forms of inguinal hernia, the peritoneal pouch lies on the anteromedial aspect of the spermatic cord. This applies only to the primary type of hernia, for in the recurrent type the anatomic character of the region has been greatly altered, and the cord may bear any one of several relations to the sac. Since the point of origin of the lower fibers of the internal oblique and transversus abdominis muscles from the fascia lata is on the lateral aspect of the deep ring, the enlargement of the ring takes place in a medial direction. The inguinal ligament and the superior ramus of the *os pubis* prevent enlargement in an inferior direction. There may be some superior enlargement, but this is usually minor owing to the restrictions imposed by the abdominal musculature. As the enlargement of the ring proceeds, the posterior inguinal wall becomes stretched and pushed outward and thus becomes part of the internal spermatic fascial covering of the hernial sac. Once the ring has reached the lateral margin of the rectus muscle, there is usually no further clinically significant increase in size.

Sliding Hernia: Ryan[5] defined a sliding hernia as one in which a part of the bowel or other retroperitoneal organ or its blood supply protrudes through a defect in the abdominal wall. This protrusion is usually, but not invariably, related to a herniated peritoneal sac. In contradistinction to the

actual contents of the hernial sac, these sliding components lie neither free in the sac nor bound to it by adhesions. Sliding hernias are divided into three groups. First, there is the intrasaccular type, in which the sliding component is free except for its mesentery, the peritoneum of which is continuous with that of the hernial sac. Second is the parasaccular (intramural) type, in which the sliding component lies in the wall of the sac. In this type the sac of the peritoneum is in direct contact with the component and cannot be removed without damaging the organ. Last is the extrasaccular type, in which the sliding element is readily separated from the outer surface of the peritoneum of the hernial sac or may be distinctly separate from the sac. The most common of these types is the parasaccular, and the sliding element most frequently observed is a portion of the bowel.

Complications.—The complications of inguinal hernia are few but may be so critical that the patient's life is seriously jeopardized. Usually the contents of the sac may be reduced into the abdominal cavity by the manipulations of the examiner. Sometimes, however, the sac and its contents may become incarcerated, or the defect in the abdominal wall may be of such a nature that the hernia cannot be reduced. This may become a difficult situation, for if bowel is caught in the sac it is exposed to external trauma and therefore to possible rupture. If this occurs, peritonitis, with all its grave complications, will follow.

A more common, important, and serious difficulty encountered is strangulation. When this occurs, the sac first becomes incarcerated; the pressure on the wall of the sac is increased, and the veins of the contained viscera are obliterated. This leads to stasis of the blood flow, eventual infarction and subsequent gangrene. Strangulation, therefore, represents an acute surgical emergency.

An extremely rare complication of inguinal hernia is the presence of a tumor in the hernial sac. Recently, Bieber and Wolstenholme[6] reviewed the literature on this subject and found a total of only 15 cases of this kind reported. Some of the hernias were intrasaccular and some extrasaccular. There were 3 carcinomas; one of a vesical diverticulum, one of the appendix and one of the small bowel. There were also a lipoma, a liposarcoma, 2 mesotheliomas, a fibroma, a fibrosarcoma and 2 fibromyxomas. Therefore, although it occurs only rarely, one must consider the possibility of a tumor when sudden enlargement of the hernia is noted.

Diagnosis.—Direct Hernia: Direct inguinal hernia is usually asymptomatic. The patient simply notes painless swelling in the groin, which usually appears after heavy strain and disappears on lying down. This swelling reappears on straining in the recumbent position and also on standing. Strangulation with this type of hernia is rare, because in most cases the neck of the sac is quite large. As the sac becomes enlarged it is usually confined to the area contiguous or adjacent to the inguinal ligament. The mass is rarely encountered in the scrotum, and when it does present there it is usually confined to the upper part.

The diagnosis of direct hernia is not easily made. The sac goes through the subcutaneous inguinal ring and tends to remain small and incomplete. Physical examination reveals a mass adjacent to the pubic tubercle, deep and medial to the spermatic cord. One can usually find a circular opening from which the inguinal canal apparently goes directly backward into the abdominal cavity, rather than obliquely upward as with the indirect variety of hernia. When the examining fingers are placed on the mass and the

patient is requested to cough, the impulse of the mass comes from the floor of the canal, propelling the finger outward. This sign is in contradistinction to those accompanying the indirect type, in which the impulse comes from above and progresses downward. A truly conclusive differential diagnosis can be made by the following maneuver: First, the examiner reduces the hernia, and then inserts his index finger into the subcutaneous inguinal ring. This is accomplished by invagination of the scrotal skin. At this point he must verify the presence or absence of an impulse or of any sort of resistance. Next, the tips of two fingers of the other hand are placed over the inguinal canal medial to the deep ring, and the patient is requested to cough or strain. If this produces an impulse against the index finger, the diagnosis of direct hernia is accepted. If no impulse is palpable, the hernia is of the indirect type.

Indirect Hernia: The diagnosis of indirect hernia is accomplished by successfully following the sac through the deep ring down the inguinal canal and out through the subcutaneous ring into the scrotum. McVay[1] stated that in some cases large direct hernias can be seen well down in the scrotum, although usually any hernia involving the scrotum is of the indirect type. When the scrotum is invaginated and the finger placed in the subcutaneous ring, a sudden cough by the patient will demonstrate the hernia passing obliquely down the inguinal canal. If the subcutaneous ring is small and the finger cannot be introduced, pressure over the deep ring will prevent the bulge from appearing. The direct type, however, will still present the bulge. McVay[1] also pointed out that it is often of great value to test the strength of the posterior inguinal wall. This may be accomplished by placing the patient in a reclining position, with the examining finger inserted through the subcutaneous inguinal ring. After the indirect hernia has been reduced in this manner the finger is pressed posteriorly, and, with the patient straining, the examiner notes whether the tissue against his finger is hard or soft. If it is hard, the posterior inguinal wall is reasonably strong; if it is soft, the hernia is either direct or combined direct and indirect (the so-called "pantaloon" type).

The physical signs associated with direct and indirect hernias are several, but only the most important are recorded here. First, there is the presence of an abnormal, visible swelling in the groin, which may be hard or soft. Unless the hernia is incarcerated, the mass can be made to disappear with gentle pressure and to reappear with coughing or straining. Two other signs are tympanitic percussion notes elicited over the hernial sac and the auscultation of bowel sounds in the area. As far as pain is concerned, it may be local or may be referred to the epigastrium on traction of the peritoneum or the contained viscus.

The differential diagnosis of hernia includes consideration of femoral hernia, inguinal lymphadenopathy, varicocele, undescended testis, testicular tumors and hydrocele of the tunica vaginalis. The diagnosis of sliding hernia is made only at operation.

Treatment.—Most authors maintain that inguinal hernia is a surgical problem. Trusses do not seem to correct it, and they apparently give the patient a false sense of security. Actually, an ill-fitting truss is likely to give the patient more trouble than no truss at all. The indications for operation are a matter of great concern. In most cases the surgeon insists upon a demonstrable hernial sac before he operates. DeWeese and Hunter,[7] however, pointed out that in many cases patients are rejected for employment because the company physician has noted a relaxed inguinal ring in a routine physical exami-

nation. They pointed out, furthermore, that statistically these persons are not predisposed to the development of hernia. Since they cannot be employed unless the relaxed ring is tightened, these authors consider the surgeon justified, in some cases, in repairing the ring and thus improving the patient's economic situation.

Another important factor in consideration of the indications for surgical intervention is the age of the patient. With the aged patient, the problem is obvious, and the decision to operate is made on a basis of medical judgment as to the need for the operation and the ability of the patient to withstand it.

With children, however, the problem is not so obvious. A hernia in a child may recede spontaneously. Davis[8] has proposed an excellent set of arguments for early operation in cases of inguinal hernia. In his opinion, reluctance to operate on the young is based largely on superstition and an erroneous belief, i.e., that children are unable to withstand anesthesia and surgical treatment. In answer to the argument that infantile structures are too delicate and fine to be subjected to surgical trauma, he pointed out that much more delicate operations (notably in ophthalmology) are often successfully performed on children.

Other answers to apparently groundless arguments against pediatric surgery are as follows: (1) The chance of recurrence is lowest in infancy and early childhood; (2) the possibility of sudden incarceration is eliminated; (3) the elimination of a known genital defect is good from the psychic standpoint, and,[4] early operation eradicates the evils attendant on the wearing of a truss. The high incidence of recurrence after repair of an inguinal hernia repair attests to the fact that there is no ideal operation for this condition. As has been mentioned earlier, there are three classic technics—the Bassini, the Halsted, and the Ferguson methods. The greatest difference among these three is the eventual resting place of the spermatic cord. Briefly, Bassini advocated dissection of the sac with ligation of its neck. The conjoined tendon and the inferior margin of the internal oblique muscle are sutured to the inguinal ligament from the deep inguinal ring to the tubercle of the *os pubis*. This juncture forms a wall against which the spermatic cord is placed. Then the aponeurosis of the external oblique is closed over the cord and the superficial ring is re-formed, thus reinforcing the posterior wall and maintaining the obliquity of the inguinal canal.

In his first operation, which he later abandoned for a modification of the Bassini procedure, Halsted ligated the peritoneal sac at the neck and approximated the inguinal ligament to Cooper's ligament. In this procedure the external oblique aponeurosis was closed deep to the cord in order to reinforce the posterior inguinal wall; thus, the subcutaneous inguinal ring was directly on top of the deep ring, and the cord was left lying in the subcutaneous fascia. In McVay's opinion this procedure is poor, because the obliquity of the inguinal canal and the shutter action of the overlying muscles are destroyed. He considered the use of this technic the cause of a high incidence of recurrence.

In Ferguson's operation the sac is tied off, the cord is placed deep and Cooper's ligament is sutured to the inguinal ligament, superficial to the cord. The external oblique aponeurosis is then closed over this. This operation also destroys the obliquity of the canal and, like the Halsted I technic carries high incidence of recurrence as a direct inguinal hernia. Iason[3] has outlined a rational approach to the repair of a direct hernia—an approach he divides into a few basic steps. First, an incision is made over the subcutaneous inguinal ring, exposing the pubic tubercle and allowing easy retraction of the medial flap of the

external oblique aponeurosis. Then the aponeurosis is separated in line with the superior pillar of the superficial ring, in order to prepare the lateral flap for subsequent imbrication. Next, the spermatic cord structures are dissected and isolated, the sac in the inguinal triangle is grasped, and upward traction is accomplished. The fibers of the conjoined tendon and the weakened transversalis aponeurosis are thereby placed under tension. At this point a circular incision is made through the fibers of the conjoined tendon, with its attached cremaster fibers and fascia. The transversalis fascia is then severed in a circular manner, and the hernial sac is exposed free in the medial portion of the inguinal canal. The sac is then opened; the bladder (which often makes up its medial wall) is mobilized and retracted medially, and the sac is transfixed and removed. Now the transversalis fascia is applied, with interrupted sutures, in an overlapping manner over the stump of the sac. The conjoined tendon is sutured with interrupted strands and the aponeurosis of the external oblique muscle is closed with the cord subjacent to Scarpa's fascia. The skin is then closed. Burton,[2] in a series of papers, advocated a combined repair of the inguinal ligament and Cooper's ligament. He commented that surgeons tend to classify hernia operations into two groups, repairs of Cooper's ligament and repairs of the inguinal ligament and suggests he also feels there are advantages in combining the salient features of the procedures. He discussed this type of operation in terms of three distinct maneuvers. First the parietopectineal; second, the inguinopectineal, and third, the combined maneuver. Actually, the combined maneuver is an integration of two standard procedures. Pectinealizing the parietal strata (if done so as to obtain a firm union to Cooper's ligament), will result in a uniformly strong wall in a high percentage of cases. Having carried out the inguinopectineal maneuver, one arrives at a point where the parietal wall and the inguinal ligament have been pectinealized. The musculofascial attachment to Cooper's ligament is made first, for two reasons: to obtain a better exposure of Cooper's ligament and to avoid excessive surgical trauma to the ligament since loops of underlying fascial suture are routinely used for inguinopectineal anchorage. The integrating maneuver is carried out by suturing the crest of the convex surface of the inguinal ligament to the adjacent previously pectinealized anterior parietal wall. A vertical raphe, which now acts as a central tendon and gives triple anchorage of the parietal wall to Cooper's ligament, is thus created. Burton stated that the patients who are good candidates for this operation are those who present with any one of the following conditions: attenuation of the inguinal ligament, interligamentous hernia, diffuse mesenchymal weakness or refractory hernia, including the sliding and most recurrent types.

Once the hernia is recognized as the sliding type, the neck of the herniating mass must be separated from the transversalis aponeurosis at the external ring. The spermatic cord may then be freed from the herniating mass—the mass being left with intact properitoneal fat inside a thin layer of limiting fascia. The final steps may then be undertaken—removal of any of the sac distal to the attachment of the sliding component and replacement of the mass remaining because of the transversalis fascia. The latter is then closed over it and made snug around the cord. It should be emphasized, however, that a sliding hernia differs from the ordinary type only in that the total sac cannot be removed. The same problems are present as are encountered in the treatment of direct and indirect hernias, namely ligation of the sac as high as possible, "snug-

ging up" the internal ring, closing the defect in the transversalis aponeurosis and applying a form of plastic repair to the floor of the canal.

The great variety of hernial repairs bears testimony to the fact that no one repair is ideal and adequate. Restoring the complex anatomic character of the anterior abdominal wall is indeed a difficult task, and the results are not invariably successful. Thieme[9] stated that frequent cause of recurrence is the performance of too extensive an operation especially on a patient who needs only one or two stitches at the internal ring. When a major surgical procedure is employed to strengthen an already adequate inguinal canal, the normal anatomic nature of the region is frequently disrupted.

A ten-year follow-up is the minimum acceptable period for evaluation of one's results with inguinal hernia. Frequently, authors report a recurrence rate of 3 to 6 per cent for indirect hernia and 5 to 11 per cent for direct hernia. Factors that seem to increase this recurrence rate are age, obesity, concomitant disease, postoperative complications, an unwise choice of suture material, improper anesthesia and, most important of all, the difficulties inherent in the surgical technics involved.

Present Series.—This study is based on 977 cases of inguinal hernia treated surgically. The peak age incidence was in the fifth decade of life (Table 1). Sixty-two per cent of the patients making up this series were between 30 and 50 years old. This age distribution is quite similar to studies by Estes[10] and by Lund and Lindenberg,[11] who noted a peak incidence among patients between the ages of 40 and 60. The former series consisted of 363 patients; the latter, of 808. Seventy-eight per cent of the patients in this series were male—a preponderance similar to that recorded in the other studies. Of the hernias in this series, 85 per cent were diagnosed as indirect, while the remaining 15 per cent consisted of the direct and sliding types. The preponderance of indirect hernias is striking, and is more pronounced than in other studies, which have reported a preponderance of 62 per cent.[10] The average convalescent period did not seem to depend on whether the hernia was of the direct, the indirect or the sliding type, for the average convalescent period was between seven and eight days for all types. In more than 90 per cent of the cases the hernias were treated according to the modified Bassini or the modified Halsted procedure.

Twenty-one per cent of the hernias were classified as small, 42 per cent as medium and 37 per cent as large. This is again similar to the data on the Lund series, in which 32 per cent were described as small, 49 per cent as medium and 18 per cent as large. The incidence of postopera-

TABLE 1.—*Age of Patients*

Age (Years)	*Number of Cases*	*Per Cent of Total*
20-29	80	8
30-39	231	24
40-49	367	38
50-59	249	15
60-69	119	12
over 70	31	3
Totals	977	100

TABLE 2.—*Postoperative Complications*

Complication	*Number of Patients*
Pulmonary	
Atelectasis	4
Pneumonia	15
Infection of upper part of respiratory tract	27
Embolism	2
Paralytic ileus	3
Wound	
Infection	12
Draining sinus	2
Hematoma	9
None	903

tive complications was 8 per cent. Similar studies (Estes,[10] Lund and Lindenberg[11]) have shown a range of 2 to 10 per cent. Pneumonia and infections of the upper part of the respiratory tract accounted for the majority of these complications (57 per cent) ; wound complications accounted for 31 per cent. Other rare complications were pulmonary atelectasis, paralytic ileus and pulmonary embolism. The last mentioned complication proved fatal in the 2 cases in which it occurred. These were the only deaths in the series (0.2 per cent). Other series have shown hydrocele and atrophy of the testis to be infrequent complications. The latter was not encountered in my studies.[10]

The recurrence rate for our patients with direct hernia was 2.4 per cent and for those with indirect hernia 3.9 per cent. In other studies this rate has ranged from 0.46 to 13 per cent.[12] Our long-term studies are similar to those of Estes,[10] who encountered 5 recurrences in 303 patients, or 2 per cent. There have been no recurrences in patients with sliding hernia. We agree with Estes as to the causes of recurrence, for in most of our patients complications also developed, owing to tension on the suture lines and infection of the wounds.

ZUSAMMENFASSUNG

Die Entwicklung des Interesses an Leistenbrüchen wird mit einer Erörterung der zahlreichen und verschiedenartigen ursächlichen Faktoren der Erkrankung beschrieben. Differentialdiagnostische Zeichen bei der Körperuntersuchung von Patienten mit Leistenbrüchen werden dargestellt. Verschiedene chirurgische Verfahren und ihre anatomischen Grundlagen werden beschrieben. Schliesslich wird eine statistische Analyse von 977 Fällen gegeben und hinsichtlich des Alters und Typus des Patienten, der chirurgischen Behandlung, der postoperativen Befunde und der Rückfälle erörtert. Die Ergebnisse ähneln denen früherer Untersuchungen. Die verschiedenartigen und sich oft widersprechenden Auffassungen in der Frage von Leistenbrüchen werden mit Nachdruck dargestellt.

RÉSUMÉ

L'auteur note l'intérêt croissant manifesté à l'égard de la hernie inguinale et décrit ses facteurs étiologiques nombreux et variables. Diverses méthodes opératoires sont étudiées en tenant compte de leurs bases anatomiques. Enfin, une étude statistique de 977 cas est présentée et discutée, compte tenu de l'âge, du type de hernie, du traitement opératoire, de l'état post-opératoire et des récidives. Cette étude est similaire à celles publiées antérieurement. L'auteur insiste sur le nombre d'opinions diverses et parfois contradictoires concernant la hernie inguinale.

RIASSUNTO

L'ernia inguinale, e i suoi numerosi e vari fattorietiologici, è un argomento di interesse sempre crescente. Vengono esposti gli elementi clinici della diagnosi differenziale e descritti i vari metodi operatori e i rispettivi principi anatomici. Viene presentata, infine, una statistica operatoria di 977 casi, con riferimenti all'età, al tipo, alla terapia chirurgica, alle complicanze post-operatorie e alle recidive. Vengono discusse le varie e talora discordi opinioni sull'ernia inguinale.

RESUMEN

Se describe en este trabajo la evolución del interés sobre la hernia inguinal con extensión sobre los numerosos y variables factores etiológicos. También se enumeran los diferentes puntos del diagnóstico y del examen físico de las hernias inguinales. También se describen varios procedimientos operatorios con sus fundamentos

anatómicos. Finalmente se expone una estadística de 977 casos operados con un análisis en relación con la edad, el tipo, el método quirúrgico, las condiciones post-operatorias y las recidivas, siendo este análisis similar a otros hechos con anterioridad. Se llama la atención sobre la diversidad de opiniones en relación con los problemas que plantéa la hernia inguinal.

SUMARIO

Descreve o aumento de interesse na hernia original, acrescia de discussão dos numerosos e variaveis fatores etiologicos.

São apresentados dados de diagnósticos diferencia no exame fisico das hernias inguinaes. Descreve varias tecnicas operatórias com suas bases anatomicas. Finalmente é apresentada uma análise estatistica de 977 casos e discutida em relação à idade, tipo, tratamento operatório, condições operatórias e recurrencias, sendo a analise similar aos estudos anteriores. As opiniões diversificadas e as vezes en conflito em relação à hernia inguinal são assinaladas.

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When one reads of the beliefs of savages, or of the ancient Babylonians and Egyptians, they seem surprising by their capricious absurdity. But beliefs that are just as absurd are still entertained by the uneducated even in the most modern and civilized societies. I have been gravely assured, in America, that people born in March are unlucky and people born in May are peculiarly liable to corns.

—*Russell*

Biliary Ileus

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THE WORD *"ileus"* is much used as a synonym for "intestinal obstruction." It is often qualified by the adjectives, *dynamic*, indicating a mechanical obstruction, and *adynamic, paralytic* or *inhibitory*, indicating merely the absence of peristaltic activity.[1] "Ileus" is a substitute for the expression "intestinal occlusion" or "closure of the intestine." The two expressions are equivalent, since each has a limited meaning, from the etymologic point of view. The Germans use the Latin term *"ileus"* or the germanic word *Verschluss*, meaning "closure," qualified by the words *"acute"* or *"chronic."* Ileus, or intestinal obstruction, is a state in which there is an obstacle to the passage of the contents of the intestine—gases, liquids or solids—down the intestinal space. *Biliary ileus* means an obstruction due to gallstones.

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A case is reported in which a patient aged 83, with biliary ileus and an acute abdominal syndrome due to occlusion by mechanical ileus, was operated on with entire success. An unusual feature was the postoperative discovery of a vesicobiliary fistula.

The world literature is reviewed and the disease discussed from the etiologic, pathogenic, pathologic, symptomatic and diagnostic points of view, with comments on preoperative and postoperative management and a description of the technic employed by the author.

In a very recent work, reviewing the literature on the subject, Mariano de Andrade and Izidoro Antonio Wendler[2] stressed the rarity of intestinal obstruction due to gallstones. They estimated a total of 500 published observations since Bartholin[3] first recorded such a case in 1654, adding that such cases are becoming more and more infrequent. They expressed the well-founded opinion that earlier intervention on the bile ducts has prevented this complication.

Statistically, the incidence is small. MacIver,[4] in a study of 335 cases of mechanical obstruction observed at the Massachusetts General Hospital, noted that in only 1 per cent was it due to gallstones. Souttar[5] also observed gallstones as a cause in only 1 per cent of a series of 3,064 cases of obstruction. Hand and Gilmore[6] recorded 208 cases of obstruction due to biliary ileus, and Guarner[7] estimated an incidence of 1 to 3 per cent of a total of 12,153 cases of intestinal obstruction recorded in the world literature.

In Brazil, too, recorded cases are few. Freitas and Hossne[8] had a series of 18 cases. Felix R. de Almeida[9] presented 3 observations. Mariano de Andrade and Izidoro Antonio Wendler,[2] who observed 210,500 patients treated at the Hospital dos Servidores do Estado (Hospital for Federal Employees) over a period of ten years, recorded 2 cases. Nicola Caminha[10] reported a case at the same hospital, which is also included in Mariano de Andrade's work. Humberto Barreto[11] and Otavio Tourinho[12] presented one case each. I know of 1 case in which operation was

successfully performed by Mario Monteiro at the Hospital dos Maritimos in 1956 or 1957.

As regards the sex and age of the patients with this disease, Brockis and Gilbert[13] estimated a proportion of 1 man to 7 women. As to age groups, the sixth, seventh, eighth and ninth decades seem affected, though Figiel,[14] in a series of 12 recorded cases, included the case of a woman aged 34 who had such a crisis shortly after childbirth.

Etiologic and Pathogenic Factors.—The presence of biliary ileus presupposes the formation of a spontaneous internal biliary fistula. Biliary lithiasis is the contributing cause in 90 per cent of cases. Other causes are peptic ulcer of the duodenum or the stomach, carcinoma of the bladder, bile duct of the stomach or pancreas, hepatic abscesses and hydatic cysts. The pathogenesis of these processes includes effraction of the wall of the bladder as a sequel to an acute attack, in which the neck of the bladder becomes occluded by calculus or edema, with harm resulting to the venous, lymphatic and arterial circulation; this causes alteration of the supply to the walls, so that infection is facilitated.[15] Glenn,[16] in his study of the formation of spontaneous biliary fistulas, presents a series of drawings showing the process of erosion of the wall of the bladder, which transfers its fluid and calculus-bearing contents to the intestine. The calculus, entering the intestinal space, starts its migration and, as Morlock[17] stated, it may be assumed that the majority of the stones pass through the rectum without difficulty.

Pathologic Picture.—The effects of the obstruction, at one and the same time, are both local, on the intestinal wall, and general, that is, affecting the body as a whole. They vary according to the point of obstruction, the increase in pressure, the duration of the pressure and the degree to which the blood supply is affected. The most important factor in the clinical and pathologic alterations is the location of the obstructive process. When obstruction occurs at a point high in the small intestine, it causes substantial and serious alterations in the blood chemical values. In this respect, the work of Hartwell[18] and Hoguet in 1912 on dogs subjected to duodenal blockage is well known. Other workers have shown substantial alterations, especially reduction of ions and of sodium chloride, dehydration and an increase in nonprotein nitrogen. Acidosis or alkalinosis may set in. The concentration of the blood is note-

Fig. 1.—Straight roentgenogram of abdomen with patient in dorsal decubitus position, showing distention of loops of small bowel; plate did not permit good visualization of biliary-digestive fistula or location of biliary ileus in terminal portion of ileum.

worthy in this connection. Peters[19] pointed out the paradoxic effect of water given by mouth in cases of high obstruction. Salts are excreted and are also lost in the vomitus. The blood becomes hypotonic. The kidneys are called into action to correct this deficit and eliminate larger quantities of water; thus concentration, plus circulatory insufficiency due to loss of sodium, leads to dysfunction of the kidneys with nitrogen retention.

The obstruction provokes distention. The vomiting empties the intestine above the obstruction. Thus an obstruction at a high point in the small intestine may empty the contents by vomiting, whereas an obstruction in the lower part cannot unload the contents of the intestine by vomiting, and accumulation of liquids and gases results.

From the histologic angle, there is considerable blood stasis at the point of strangulation. The submucosa becomes infiltrated with red and white blood cells. The inflamed mucus sheds its epithelium, which flakes off, while the glands enter into a state of granular degeneration or even necrosis. The deep layers display intensive diapedesis, with alteration of the muscular fibers. At this stage microbes may traverse the intestinal wall even without perforation: *"At this moment there is direct microbial penetration."*[20]

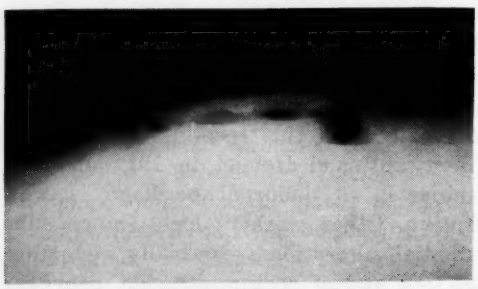

Fig. 2.—Straight roentgenogram of abdomen with patient in lateral decubitus position, showing air pocket that marks distention of loops of small bowel.

Symptoms and Diagnosis.—Intestinal obstruction frequently commences suddenly and without warning. The prior causes have already arisen. The main symptoms are pain in the abdomen, vomiting and obstipation (extreme constipation).[21] The pain is produced by the distention and the hyperperistalsis with which the intestine reacts to the obstacle, the latter taking the form of mild colic. Although the location may vary, the point of the obstacle may thus be indicated. The higher the obstruction, the earlier vomiting takes place. As a matter of fact, Wangensteen[22] has affirmed that "intestinal colic, accompanied by considerable distention without vomiting, is generally due to obstruction of the colon." When the blockage is at a low point, the material vomited undergoes a change; in the beginning it consists of the gastric contents colored by the bile from the upper part of the small intestine. Later it becomes transformed into the contents low in the jejunum and ileum, rich in colon bacilli and having a fecal odor. Hence the expression *fecaloid vomit,* although the vomitus does not contain actual feces. Complete obstipation does not set in at once. A clyster emptying of the free distal portion may look like a normal evacuation.

At first, the general appearance of the patient does not cause concern. Little by little dehydration sets in and distention increases. Visible peristalsis is not always present. Gurgling sounds, similar to those produced by the emptying of a bottle of water, may be the earliest physical sign of the obstruction.

Formal diagnosis of an ileomechanical obstruction and, more precisely, of biliary ileus, is arrived at by roentgen examination.

In 1941, Rigler and Noble[23] laid down the classic signs for the diagnosis of biliary ileus: (1) partial or complete intestinal obstruction; (2) direct evidence, by

means of a contrast medium, of the presence of calculi in the intestine; (3) the presence of air in the bile ducts, or opacity of those ducts after oral administration of barium by mouth, and (4) disappearance of the calculus, first located in the bladder and then migrating into the intestine.

Treatment.—The treatment of intestinal obstruction is aimed at (1) elimination of the cause of the obstruction and reestablishment of the normal function of the intestine; (2) reduction of pressure in the intestinal space, produced by the obstruction (these two aims are in many cases achieved as a result of the same operation, and reduction in the pressure in the intestinal space of intubation may in some cases render it unnecessary to remove the obstructive lesion); and (3) correction of the general harm caused by the obstruction.[21]

Of a series of 54 studies considered by the author, Glenn[16] presented a statistical report on 40 patients with biliary enteric fistulas in a group of 40,583 patients operated on for biliary diseases over a period of twenty-four years (1932-1956). Of these 40 patients, 30 were women and 10 were men. Their ages varied from 28 to 87 years, 6 being under 50, 10 between 50 and 60 and 24 over 60. The duration of symptoms ranged from one month to thirty-eight years. Diagnosis was made at operation or autopsy in 36 cases, and in only 4 cases by preoperative roentgen examination. There were 8 deaths in the group, 4 due to postoperative complications; 3 to carcinoma and 1 to hepatic abscess and septicemia.

This experience of Glenn's lies behind the emphasis he lays[16] on the surgical emergency in cases of mechanical obstruction of the small intestine due to biliary ileus. His remarks are so pertinent that it seems preferable to quote him directly:

"Small bowel obstruction is a surgical emergency. Unrelieved it may rapidly terminate in death. When it occurs in association with a biliary enteric fistula and as a result of a gallstone, the same statement still remains applicable. The relief of the intestinal obstruction is of first importance and the correction of the fistula is secondary. If it is suspected that an intestinal obstruction is due to a gallstone or gallstones in the small bowel, we believe indwelling gastrointestinal tube decompression is contraindicated and that operation should be undertaken as soon as the patient has been adequately prepared. At operation relief of the intestinal obstruction is the primary objective. The gallstone is impacted most commonly in the terminal 50 centimeters of the ileum. The bowel proximal to the obstruction is distended with fecal material and the adjacent wall is friable and edematous. The intestinal wall that engages the stone may vary from being the site of mild inflammatory reaction to complete necrosis with perforation. If this segment of bowel is viable the stone should be dislodged into the distended proximal segment and removed lodged through an ileotomy. If there has been a perforation or if the bowel wall is not viable then this area where the stone was lodged should be resected and an end-to-end anastomosis

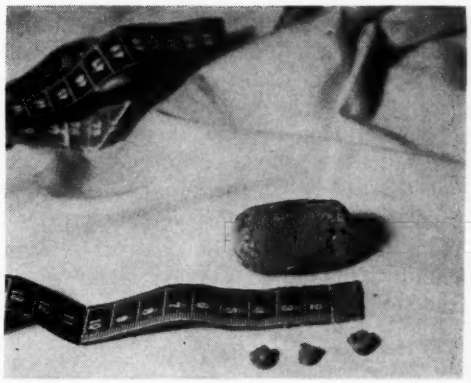

Fig. 3.—5-cm. biliary calculus 5 cm. in diameter, weighing 20 Gm., and three of four smaller calculi removed from terminal portion of ileum.

performed. Nothing more should be done at this operation. After the patient has recovered from the operation, and the intestinal obstruction, complete evaluation should be made seeking, in particular, to determine the exact location of the fistula and the status of the biliary tract. We are convinced that any definitive attack upon the fistula or biliary tract is contraindicated in the presence of acute obstruction caused by a gallstone."

REPORT OF A CASE

A white Brazilian widow, a teacher 83 years of age, had been treated homeopathically. There was chronic obstipation of the stomach, which had been worse of late, after an abdominal attack in which patient was treated by the Assisttência Pública (public ambulance service).

The attack to be reported here began with abdominal pains, growing worse toward the pelvis. Hyperesthesia was observed. There was no rise in temperature. The patient was attended and treated by Dr. Aécio do Val Villares; because the pain became worse, a surgeon was called in for conference after twenty-four hours.

The patient was apyretic, and fecaloid vomiting had started. The initial stages of distention were apparent in the left iliac fossa. Vaginal and rectal palpation confirmed the site of the pain. Rectoscopic study revealed no abnormality. No tumor was present, nor was any blood.

A tentative diagnosis of high intestinal occlusion due to mechanical ileus having been established, immediate operation was proposed lest dehydration should become worse.

The patient was taken to the Santa Lucia nursing home, after completion of the necessary tests. Plain roentgenograms (Dr. Affonso Millan) confirmed distention of loops of the small bowel. An opaque clyster was performed under radioscopic control and showed proof of free passage through the large bowel.

General anesthesia was induced by Dr. A. Zugliani. The surgical team consisted of Drs. Eduardo Marques Tinoco and Armando Vilhena Machado. A left paramedian infraumbilical incision was made. With the skin protected, the peritoneum was opened and the abdominal cavity explored. An obstacle was encountered at the level of the pelvic portion of the ileum. A loop of the jejunum was exposed, in a satisfactory state of irrigation, and 1 biliary calculus 5 cm. long, weighing 20 Gm., was removed, together with 4 smaller calculi.

The intestine was closed in two planes. The viscera were explored and proved normal except in the region of the bladder, where there was an adhesion between the lower surface of the liver and the duodenum and the first loop of the jejunum. These adhesions were interpreted as involving the region of the biliary-digestive fistula.

The peritoneum and the abdominal wall were closed. The postoperative course was excellent for the first twenty-four hours. Later the patient had paralytic ileus, but this was overcome, and she was later discharged as cured.

COMMENT

The patient's syndrome was that of intestinal occlusion due to mechanical ileus. In such a case the obstacle may be composed of enteroliths, phytobezoar, zoobenzoar, fecal concretions, aggregations of ascarids or other worms or biliary calculi. No clinical history was available. The patient was old and in serious condition, a long-time client of symptomatic homeopathic medicine, and precise information could not be obtained directly from her or from her family. Later, the compilation of case data gave grounds for suspecting a gallstone attack two or three years earlier, at which time the patient had been attended by the public ambulance service. Lately, too, she had had attacks of nausea, and the chronic intestinal obstruction had become more serious.

The case seemed to call for an emergency operation, and the sequelae confirmed this opinion. Although operation was performed in the early morning hours, as many tests as possible were made. Roentgen examination consisted, first, of a straight posteroanterior abdominal view. This showed distention of the abdominal loops, but it did not identify the obstacle

or reveal air in the bile ducts. A second film was taken, with the patient in the left lumbardorsal decibitus position; this revealed the presence of an air space. An opaque clyster was performed with the patient in the posteroanterior position, which showed the large bowel to be free.

A large incision—left paramedian infraumbilical—was chosen in order to permit complete exploration of the abdominal organs. The obstacle was encountered in the terminal portion of the ileum. The incidence of this location is estimated by Hertz[24] at 86 per cent, followed by 6 per cent in the jejunum, 4 per cent in the duodenum, 2 per cent in the colon and 1 per cent in the rectum. In 2 cases described by Morlock[17] in a series of 6, in only 4 of which the diagnosis was made prior to operation, diagnosis was achieved as a result of the elimination of calculi through the anus. In 1 of these cases evacuation was spontaneous; in the other, through manipulation by hand after proctologic discovery. The loop was exposed and incised. The ileotomy released the largest stone, which was followed by 4 smaller ones. Inspection did not reveal any more concretions. A careful examination of the viscera revealed merely an adhesion of the inner surface of the liver to the duodenum and the first loop of the jejunum, indicating that the bladder had opened at the rear, followed by passage of the stones through the biliary-duodenal fistula.

Later roentgen examinations using the Marina Fiol technic, the stomach, duodenum and jejunum being taken in the posteroanterior, and the ileum in anteroposterior position, at forty-five minutes, fifty minutes, sixty-five minutes, two hours and forty-five minutes, six hours and twenty-four hours, respectively, revealed the fistula by means of the barium, especially in the plates taken at six and at twenty-four hours.

The predominance of the occlusion syndrome being kept in mind, neither cholecystectomy nor excision of the biliary-digestive fistula was done at the time of the enterotomy, because the patient's condition contraindicated such measures.

Fig. 4.—Roentgenogram taken after ingestion of barium, at twenty-four-hour point, showing biliary-digestive fistula.

CONCLUSIONS

Biliary ileus is rare, and the world literature contains about 500 published observations of it since the first case was recorded related by Bartholin in 1654.

The Brazilian literature contains 18 cases reported by Freitas and Hossne; 3 reported by Felix de Almeida; 2 described by Mariano de Andrade and Izidoro Antonio Wendler, all published, and 2 described in personal communications from Humberto Barreto and Otávio Tourinho. I have heard of cases operatively treated

in private clinics by Hugo Pinheiro Guimarães and Mário Monteiro e Mesquita, in addition to the case here described and documented.

The distribution by sex is 1 man to every 7 women, and age groups most vulnerable are those in the sixth, seventh, eighth and ninth decades. The youngest patient whose case has been reported was a 34-year-old woman; the oldest was 84 years of age. My own patient was 83.

The presence of a biliary ileus presupposes the formation of a spontaneous internal biliary fistula, to which biliary lithiasis contributes in 90 per cent of instances; other causes are ulcer of the liver, duodenum or stomach, carcinoma of the bladder, bile ducts, stomach or pancreas, abscesses of the liver and hydatid cysts.

The diagnosis of biliary ileum is obtained mainly by roentgen examination.

In the case here described, with the syndrome of intestinal occlusion predominating, an emergency operation was done. As the state of the patient did not permit more extensive surgical maneuvers, cholecystectomy and excision of the biliary-digestive fistula were not done at the time of the enterotomy.

SUMMARY

The author presents a case of biliary ileus in a patient 83 years old, with an acute abdominal syndrome due to occlusion by mechanical ileus, operated on with complete success.

A review of the world literature on the subject is presented, including about 500 cases published since the first observation by Bartholin in 1654, plus Brazilian case records covering 23 cases published prior to this report. Mention is made of 2 cases reported by personal communication to the Brazilian College of Surgeons and 3 described verbally to the author.

A study is made of the etiologic, pathogenic, pathologic, symptomatic and diagnostic aspects, with emphasis on the importance of examination. Preoperative and postoperative measures are discussed, and the postoperative discovery of a vesico-biliary fistula is described. Treatment is examined, surgical treatment described and a criticism of the case presented.

ZUSAMMENFASSUNG

Der Verfasser berichtet ueber einen Darmverschluss durch einen Gallenstein bei einer dreiundachtzigjaehrigen Person. Es handelte sich um einen akuten Bauchzustand in Folge mechanischen Darmverschlusses. Es wurde eine Operation mit vollem Erfolg ausgefuehrt.

Der Verfasser gibt einen Ueberblick ueber das einschlaegige Weltschrifttum, das seit der ersten Beobachtung Bartholin im Jahre 1654 fuenfhundert Faelle umfasst, und fuegt dreiundzwanzig vor Niederschrift dieser Arbeit veroeffentlichte brasilianische Krankheitsfaelle hinzu. Er erwaehnt ferner zwei persoenliche Vortraege vor dem brasilianischem Chirurgenkollegium und drei Faelle, die ihm selbst muendlich mitgeteilt worden sind.

Die Verteilung der Krankheitsfaelle auf die Geschlechter und Altersgruppen wird eroertert. Auf neun weibliche Kranke kommt schaetzungsweise ein maennlicher. Das sechste, siebente, achte und neunte Lebensjahrzehnt haben das haeufigste Auftreten zu verzeichnen. Die juengste Patientin war 34 Jahre, die aelteste 84 Jahre alt.

Die Aetiologie, Pathogenese, Pathologie, Symptomatik und Diagnostik werden eroertert, und besonderer Nachdruck wird auf die Wichtigkeit der Roentgenuntersuchung gelegt. Auf praeoperative und postoperative Massnahmen wird eingegangen. Die postoperative Entdeckung einer Gallenblasenfistel wird beschrieben. Es folgt eine Untersuchung der Behandlungsme-

thoden, eine Beschreibung des chirurgischen Eingriffs und eine kritische Besprechung eines vorgestellten Falles.

RÉSUMÉ

L'auteur décrit un cas d'iléus biliaire chez un malade de 83 ans avec syndrome abdominal aigü du à une occlusion par iléus mécanique, où l'opération fut un succès complet.

Une revue de la littérature mondiale est présentée, comprenant environ 500 cas depuis la première observation décrite par Bartholin en 1654, à quoi s'ajoutent 23 cas provenant du Brésil et publiés avant ce rapport. L'auteur mentionne encore deux communications personnelles au Brazilian College of Surgeons, et trois cas qui lui ont été rapportés verbalement.

L'incidence de l'affection par rapport au sexe et à l'âge est discutée. Sur 10 cas l'on estime qu'il y a 1 homme et 9 femmes. Quant aux groupes d'âges, les périodes les plus souvent affectées se situent entre 60 et 90 ans. Le cas le plus jeune était une femme de 34 ans, le plus âgé, une femme de 84 ans.

L'auteur étudie l'étiologie, la pathogénie, la pathologie et la symptomatologie, ainsi que certains aspects du diagnostic, soulignant l'importance des examens radiologiques. Les mesures pré- et post-opératoires sont discutées, et la découverte post-opératoire d'une fistule vésicobiliaire est mentionnée. La description du traitement et de l'intervention chirurgicale s'accompagne de l'étude critique d'un cas.

RIASSUNTO

L'autore riferisce un caso di ileo biliare in un uomo di 83 anni il quale presentava una sindrome addominale acuta di tipo occlusivo e che fu operato con successo.

Viene fatta una rassegna della letteratura su questo argomento; vi sono circa 500 casi pubblicati dalla prima osservazione di Bartholin nel 1654, oltre ad altri 23 pubblicati in Brasile. Vengono ricordati altri 2 casi comunicati alla Società Brasiliana di Chirurgia e 3 riferiti verbalmente all'autore.

Viene trattata la frequenza della malattia in rapporto all'età e al sesso; si ritiene che vi sia 1 maschio ogni 9 femmine e che i periodi più colpiti siano il 6, 7, 8 e 9° decennio di vita. Il malato più giovane aveva 34 anni, il più vecchio 84.

Vengono studiati gli aspetti etiologici, patogenetici, anatomopatologici e clinici dell'affezione, con particolare riguardo ai quadri radiologici; viene trattato anche il problema della terapia pre- e post-operatoria e quello della cura chirurgica.

RESUMEN

El autor presenta un caso de itio biliar, en un enfermo de 83 años con un cuadro abdominal agudo debido a oclusión por ilio mecánico, operado con éxito completo.

Se presenta una revisión de la literatura mundial a este respecto que incluye más de 500 casos desde la primera observación de Bartholin en 1.654 y en la que también se citan 23 casos publicados hasta la fecha en el Brasil. Así mismo se hace mención de 2 comunicaciones personales al Colegio de Cirujanos de Brasil y de tres casos descritos verbalmente por el autor. Se insiste sobre la incidencia de la enfermedad según la edad y el sexo. Por término medio se presenta en un hombre por cada 9 mujeres. Clasificadas las edades, las décadas sexta, séptima, octava y novena, son las más frecuentemente afectadas. El enfermo más jóven fué de 34 años y el más viejo de 84.

Se hace un estudio de la etiología, patogenia, anatomía patológica y sintomatológica haciendo especial referencia al exámen radiológico. Se discuten las medidas pre y postoperatorias y se describe un caso de fístula vesico-biliar.

Se examina el tratamiento, se describe la intervención quirúrgica y el estudio crítco de un caso.

SUMARIO

O A. apresenta um caso de ileo biliar em uma paciente de 83 ânos, com sindrome abdominal agudo devido a ileo mecânico e operado com pleno sucesso. Apresenta uma revisão da literatura mundial sôbre o assumto, incluindo cerca de 500 casos pubicados desde a la. observação de Bartholin, em 1654, e mais as publicações brasileiras que somam 23 e anteriores a este estudo. Menciona 2 comunicações pessoais ao Colégio Brasileiro de Cirurgiões e 3 casos descritos oralmente, ao A. Discute a incidência desta doença em relação ao sexo e idade. Avalia que exista 1 caso masculino para 9 femininos. No que diz respeito à idade, a 6a., 7a., 8a., 9a. décadas da vida são as mais afetadas. A paciente mais jovem tinha 34 ânos enquanto a mais vélha, 84.

Estuda os aspéctos etiologico, patogênico, patológico sintomático e diagnostico frisando a importância do exame radiológico. Medidas pre e pós-operatorias são discutidas, descrevendo a descoberta de uma fístula vesico-biliar no pós-operatorio. Examina o tratamento, descreve a intervenção cirúrgica e apresenta a crítica de um caso.

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Correction: In the box summary of the article "Suggested Aids to Surgical Treatment of Imperforate Anus and Congenital Malformation of the Rectum," p. 371, March issue, please read "Should the child be in unsuitable condition," etc.

The Surgical Treatment of Acute Arterial Thrombosis in the Lower Extremity

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The author discusses the causes, traumatic and atraumatic, of acute arterial thrombosis of the leg and foot, outlines the treatment thereof and reports 9 cases in some detail. Since this condition frequently necessitates a major amputation, he advocates early definitive operation as a limb-saving measure. Certain dangers involved in arteriographic investigation are pointed out. Thrombectomy, thromboendarterectomy and, in some circumstances, the bypass operation are recommended, with concomitant lumbar sympathectomy as an auxiliary procedure.

THROMBOTIC occlusion of a sclerotic artery may abruptly transform a relatively benign, slowly progressive disease into an acute ischemic catastrophe.

Thrombosis may occur spontaneously when the lumen of an artery is reduced to a critical level, or one of the following factors may act as a precipitating agent:

1. Change in the composition of the blood, such as increased viscosity.
2. Slowing of the blood flow due to bed rest incident to injury or illness.
3. Hypovolemia from any cause.[1]
4. External trauma or intramural hemorrhage with disruption of tissue and liberation of thromboplastic substances.

When the occluding process is gradual, owing to slowly progressive enlargement of an atheroma or increase of subintimal hyperplasia, there is an opportunity for collateral circulation to develop sufficiently to maintain nutrition.

This circulatory balance is disrupted when thrombosis occurs if vital bridging collaterals are occluded.

Distal circulation may be impaired not only by blockage of the main arterial pathway, including bridging collaterals at their orifice, but by widespread vasospasm.

In a paper dealing with traumatic cases, Edwards and Lyons[2] have stressed the relation of the time factor to thrombosis occurring in an artery under spasm, because of the high incidence of ischemia with gangrene (50 per cent after a lapse of twelve hours). They called attention to the hazard of distal propagation of the thrombus, with progressive interference in collateral blood flow.

This general concept applies to acute arterial thrombosis in the sclerotic limb, but there is a greater time lag in most instances, because of an improved collateral circulation that has developed over a period of time as a result of the underlying disease.

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An additional fortunate circumstance is the fact that organization of a thrombus distal to a point of narrowing or occlusion is delayed because of nutritional changes in the arterial wall. Even so, the danger is considerable, as was indicated in the report of Cranley and his collaborators[3] in which the loss of three out of four limbs in the early stages of peripheral arteriosclerosis was the result of sudden occlusion of the major arterial pathway.

It seems, in view of these considerations, that prompt surgery is indicated in order to reduce the incidence of amputation and the number of chronic ischemic limbs with rest pain and terminal vessel occlusion.

Lumbar sympathectomy, an operation with minimal risk, has considerable merit as a prophylactic procedure. The following case is cited to call attention to the degree of improvement which followed sympathectomy in a limb with advanced disease not suitable for direct operation.

CASE 1.—The patient, a woman aged 70, complained of claudication in the left calf, rest pain, numbness and coldness of the foot. Peripheral pulses were absent below the common femoral level. The oscillometric index was 0 at all levels below the knee. The arteriogram (Fig. 1, *A* and *B*) showed the extent of diffuse disease.

Objective evidence of increased blood flow to the distal portion of the extremity after sympathetic interruption is shown in Figure 1, *C* and *D*. Rest pain was completely relieved and claudication much lessened. There has been no clinical evidence of progress of the disease during the four-year period of observation.

In active treatment of the acutely ischemic limb, sympathectomy may be performed as an adjunct to direct operation.

It should be remembered that restoration of blood flow in the main arterial pathway removes the differential pressure that previously existed above and below the occluded segment. This eliminates the stimulus to the development of collaterals. If occlusion recurs after direct operation, the limb may become acutely ischemic because of inadequately functioning collaterals; additional protection to the limb, therefore, is provided by sympathectomy.

In order to avoid a paradoxic response, the phenomenon of hematometakinesis[4] should be taken into careful consideration. The extent of sympathetic denervation one wishes to obtain should be strictly delineated. Bilateral lumbar sympathectomy should not be performed when one limb is in a critical state.

The diagnosis of the acutely ischemic limb is self-evident. Differentiation between an embolus and a thrombus is not always possible, but the indication for operation is present in either case.

The location of the occlusion may be determined chiefly by evaluation of the major arterial pulsations, the oscillometric index and the level of temperature change in the skin.

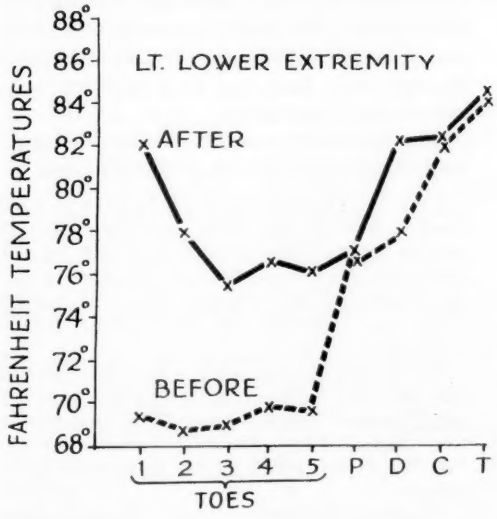
Arteriographic study is seldom necessary and may at times be dangerous to perform in a critically affected limb, because of the additional vasospasm and thrombosis induced by the contrast medium.

The arteriogram may fail to opacify distal vessels, thus tending to discourage surgical exploration. Failure to visualize these vessels does not contraindicate sur-

Fig. 1 (Case 1) *opposite*.—*A* and *B*, diffuse involvement of all major vessels. Superficial femoral artery is irregular and narrow in middle third and almost completely occluded in distal third. The profunda shows partial obliteration and no important communications. Bridging collaterals are not apparent. Upper popliteal artery completely occluded. Division into anterior and posterior tibial and peroneal arteries hardly discernible; nonvisualization below upper third of leg. (Journal of the International College of Surgeons, June 1958. Reprinted by permission.) *C* and *D*, graphs showing objective evidence of increased blood flow to distal portion of extremity after sympathetic interruption. *C*, skin temperature readings after sympathetic shock; *D*, oscillometric index before and after sympathectomy.

A

B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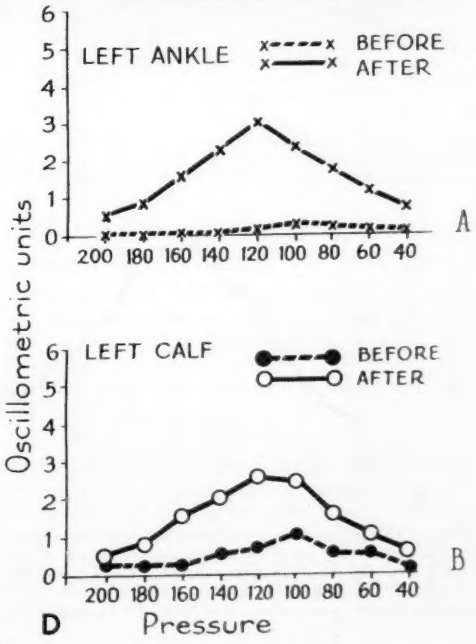
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Pressure

D

gical exploration, because circulation may be restored, even though extensive thrombosis involves the leg arteries distal to the popliteal bifurcation, provided organization of the thrombus is not too far advanced.

The final decision for or against direct operation will depend upon the condition of the popliteal artery and its branches as observed when surgically exposed.

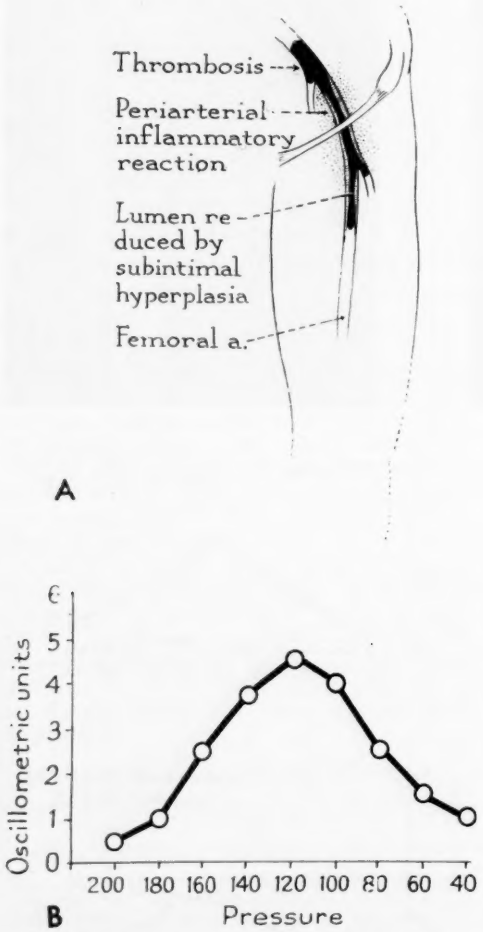

Fig. 2 (Case 2).—*A*, spontaneous arterial thrombosis occurring in a moderately diseased artery with grossly intact intima. *B*, postoperative oscillometric index at left ankle. Pressure and oscillometric index zero at all levels prior to operation.

Certain technical features merit special mention. The surgical approach to the involved artery should be such as to permit control both above and below the occlusion. Two or more arteriotomy incisions may sometimes be required.

The use of umbilical tape instead of clamps to control vessels smaller than the common iliac recommended, in order to facilitate exposure and avoid unnecessary trauma to the arterial wall.

It is considered advisable to pass a polyethylene tube through the arteriotomy incisions and to inject heparin solution before the tube is withdrawn. One should always strive to obtain adequate "backbleeding."

Spasm of a main artery, which occurs but rarely after extraction of a thrombus, is usually unaffected by sympathectic interruption but responds within a few minutes to the application of papaverine solution, 2.5 per cent, to adventitia of the artery as advised by Kinmonth and his coworkers.[5]

During the postoperative period heparin may be given if there is a special indication, such as the presence of venous thrombosis. Sympathectomy is routinely performed if the lumbar chain is within the operative field and as a separate procedure when indicated.

The following cases have been selected as illustrative of problems encountered.

CASE 2.—A man aged 54 had been confined to bed for one week because of a cast applied to the lower part of the right leg for fracture. He complained of the sudden onset of pain in left leg and foot, with numbness and coldness, of twenty-four hours' duration.

Examination revealed a cold, pale, mottled leg and foot with all pulses absent and the oscillometric index was 0. The impression was that of acute arterial occlusion of the left leg (iliac level), with threatened gangrene.

Findings at surgery: Upon exposure, after spinal anesthesia had been induced, the common femoral artery was faintly pulsatile.

The thrombus extended from the common iliac artery to approximately 3 inches (7.5 cm.) distal to the point of origin of the superficial femoral artery. The wall of the common femoral artery, as seen through the arterotomy incision, was thickened, although no break in the continuity of the intima was observed. There was a moderate degree of periarteritis (Fig. 2*A*).

Thrombectomy was performed through an arteriotomy incision in the common femoral artery. After free proximal and retrograde bleeding had been obtained, 30 mg. of heparin in physiologic solution of sodium chloride was injected distally through a polyethylene tube. There was complete restoration of the blood flow. The foot and leg became warm and of normal color.

Fig. 2*B* is a graphic representation of the oscillometric index at the ankle level.

An area of cutaneous ischemia over the anterior tibial muscular compartment, present before the operation, gradually improved. Convalescence was complicated by pulmonary embolism secondary to deep venous thrombosis of the right leg. With anticoagulant treatment, recovery occurred without incident.

Comment.—Retarded blood flow incident to bed rest may have been the initiating factor. The possibility of venous thrombosis, as illustrated in this case, should always be considered in the presence of acute arterial thrombosis.

CASE 3.—A woman aged 49 complained of pain in the right great toe and foot.

Examination revealed necrosis of the end of the great and second toes, threatened gangrene of the foot and ischemia of the lower two-thirds of the leg. The duration of the complaint was two weeks.

An arteriogram showed occlusion of the superficial femoral artery at the level of the adductor opening and interruption of continuity of the anterior tibial artery in the lowermost third of the leg.

Arterial Pulses of Left Leg

	Before Thrombectomy	*After Thrombectomy*
Femoral	0.5	4
Popliteal	0	4
Posterior tibial	0	4
Dorsalis pedis	0	3

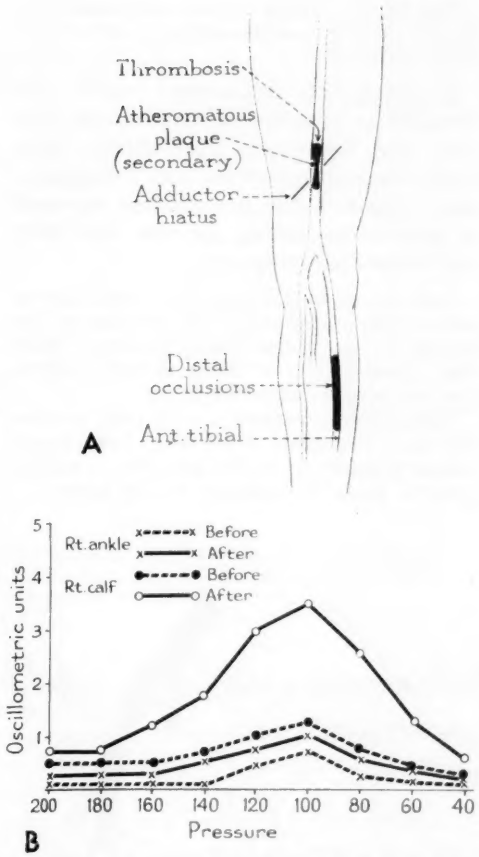

Fig. 3 (Case 3).—*A*, atheromatous plaque with occluding thrombus at level of adductor hiatus. *B*, oscillometric index before and after operation.

Exposure of the artery at the adductor opening revealed an atheromatous plaque, with an attached thrombus, completely obstructing the vessel (Fig. 3*A*). Thromboendarteriectomy was performed, followed by lumbar sympathectomy.

Restoration of distal circulation was obtained, as were cessation of rest pain, healing of necrosed areas on the toes and return of normal color and temperature to the leg and foot. Convalescence was complicated by deep venous thrombosis of the right leg, which responded in a satisfactory manner to anticoagulant therapy.

Fig. 3*B* is a graph of the oscillometric index of the right ankle and calf before and after operation.

Comment.—A satisfactory result was obtained by a combination of sympathectomy and thromboendarteriectomy. Here again venous thrombosis was a complication. The ischemic process was reversed in spite of beginning necrosis, rest pain and threatened gangrene.

CASE 4.—A woman aged 57 complained of sudden pain, coldness, and paresis of the left leg of twenty-four hours' duration. There was a past history of bilateral calf claudication and absence of pedal pulses.

Examination revealed a cold, pale, mottled left leg with paresis of the foot. Pulses were absent throughout on the left side; a normal femoral pulse was present on the right.

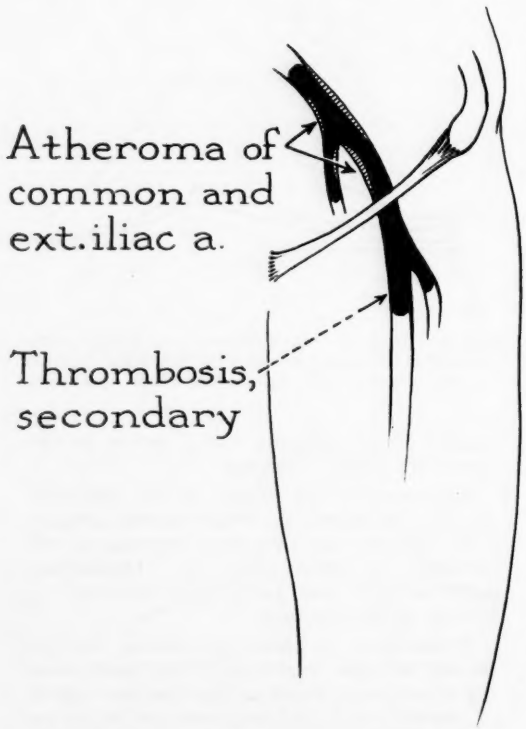

Fig. 4 (Case 4).—Sclerotic and plaque containing common iliac artery with occluding thrombus extending into the internal iliac and femoral vessels.

The preoperative diagnosis was ischemia of the left leg, with threatened gangrene due to acute occlusion of the iliac artery.

Surgical exploration revealed a thickened and plaque-containing aorta with good pulsation. A thrombus was observed in the sclerotic and plaque-containing left common iliac artery. This thrombus extended from the point of origin of the common iliac to that of the superficial femoral artery. Atheromatous changes were present, with a firmly attached thrombus in the common and external iliac arteries, while a loosely attached clot occluded the common femoral artery, the point of origin of superficial femoral and profunda (Fig. 4).

The surgical procedure consisted of exploration through two incisions, one overlying the common femoral artery and the other exposing the aorta and iliac vessels by means of a left oblique retroperitoneal approach.

Thromboendarteriectomy was performed through arteriotomy incisions made in the common iliac, external iliac and common femoral arteries. Heparin solution, 50 cc. (1 mg. per cubic centimeter) was injected into the distal artery. Complete restoration of blood flow was obtained. Left lumbar sympathectomy was then performed as an auxiliary procedure.

After the operation the leg became warm and of normal color, with return of motor function.

Comment.—Acute thrombotic occlusion with impending gangrene in diffuse disease was here reversed by prompt definitive surgery.

CASE 5.—In a man aged 63 the sudden onset of pain, coldness and numbness of the right leg and foot followed a blow on the medial aspect of thigh by the edge of a table he was

Peripheral Pulses of Right Lower Extremity

	Before Operation	*After Operation*
Femoral	4	4
Popliteal	0	4
Dorsalis pedis	0	0
Posterior tibial	0	2

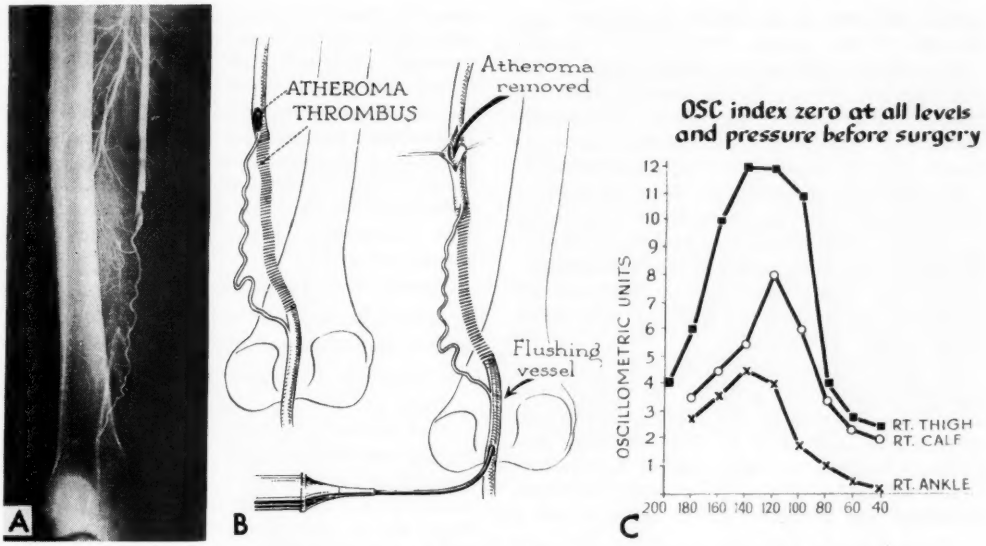

Fig. 5 (Case 5).—*A* and *B*, occlusion of superficial femoral artery in Hunter's canal (Journal of International College of Surgeons, March 1955. Reprinted by permission). *B*, oscillometric index following thromboendarteriectomy and sympathectomy.

lifting. The symptoms had been present for three days.

Examination revealed absence of pulses below the femoral level. The foot and the leg below the knee were cold and pale. The oscillometric index was 0. It was evident that the leg was markedly ischemic, with gangrene impending.

A distal femoral arteriogram (Fig. 5*A*) showed occlusion of the artery in Hunter's canal. One well-developed bridging collateral was present, which spanned the major portion of the occluded area; its efficiency, however, was impaired by cephalad extension of the occluding process.

Surgical exploration revealed an atheroma at the upper end of Hunter's canal (Fig. 5*B*), at which level a thrombus had formed and propagated distally. Thromboendarteriectomy was performed, followed by lumbar sympathectomy. There was complete restoration of the blood flow, with return of the pulses and a normal oscillometric index (Fig. 5*C*).

Five years later spontaneous occlusion recurred at the same level, with ischemia almost as severe as in the original episode. A by-pass procedure was performed from the common femoral artery to the popliteal artery, with complete restoration of the blood flow.

Comment.—This case illustrates the role of external trauma as the initiating factor causing acute thrombotic occlusion in an artery partially occluded by an atheroma.

CASE 6.—A man aged 52, with a past history of coronary thrombosis, had been treated six months earlier for severe claudication of the calf due to obliteration of the right superficial femoral artery. A femoral-to-popliteal bypass was performed, with restoration of the blood flow and disappearance of claudication.

A pulmonary embolus occurred on the second postoperative day but responded satisfactorily to anticoagulant therapy.

Progress was satisfactory until two weeks before the patient's present admission to the hospital, when sudden severe pain occurred in the right calf. The right leg below the knee became cold and pale. Numbness and crippling claudication ensued. Pulses were absent below the common femoral level, and the oscillometric index was 0 at all levels and pressures. It was apparent that acute arterial thrombosis had occurred resulting in

severe ischemia. Immediate operation was advised.

The patient refused hospitalization for the ensuing two weeks, during which time anticoagulant treatment was given. The development of continuous severe rest pain induced him to consent to surgical treatment.

Preoperative examination revealed a cold, mottled leg with dark areas of impending gangrene on the dorsum of the foot. Immediately after administration of a spinal anesthetic the right leg became increasingly ischemic, indicating the critical margin of blood supply to the limb.

At operation the common femoral, popliteal and posterior tibial arteries, as well as the prosthesis inserted at the previous operation, were thrombosed (Fig. 6). The operative procedure consisted of right lumbar sympathectomy, thrombectomy of the common femoral, popliteal and posterior tibial arteries and a common femoral-to-popliteal bypass. Arteriotomy incisions were made in the common femoral, popliteal and posterior tibial arteries. At the popliteal level, extraction and suction, plus flushing with heparin solution and counterflushing through the arteriotomy incision in the posterior tibial artery at the level of the medial malleolus, cleared the arterial tree throughout. The circulation was completely restored, and the pedal pulses returned.

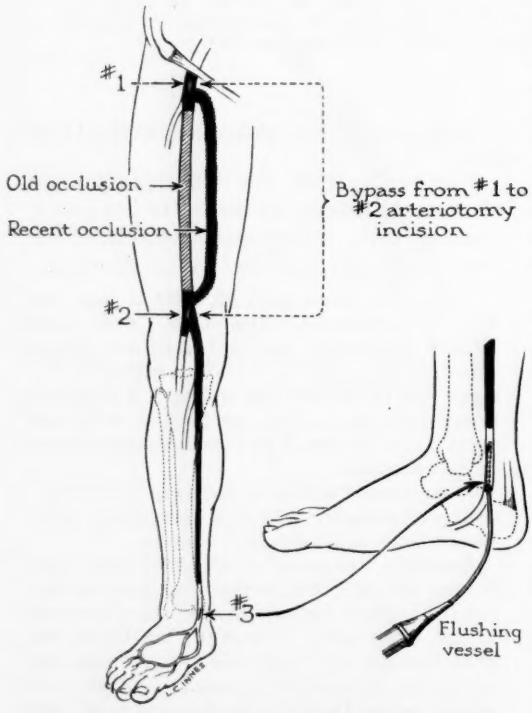

Fig. 6 (Case 6).—Acute thrombotic occlusion of the common femoral, popliteal and posterior tibial arteries as well as Teflon (femoral to popliteal) by-pass.

Comment.—Impending gangrene was reversed in spite of extensive thrombosis, which included vessels of the leg beyond the popliteal bifurcation.

CASE 7.—A woman aged 70 years was admitted to the hospital because of exsanguinating gastrointestinal hemorrhage of undetermined origin. After several blood transfusions she was taken to the roentgen department for a gastrointestinal series. As she was being placed on the roentgen table, pain suddenly occurred in both legs. It increased rapidly in severity and was unremitting. Finally its intensity increased to the point of acute agony and was unrelieved until surgical anesthesia was induced. Inability to move the legs was a secondary complaint.

Examination revealed both legs to be cold and white up to the knee level, with coolness extending to the midthigh. All pulses were absent in the lower limbs and the oscillometric index at all levels and pressures was 0.

Operation was performed approximately four hours after the onset of pain. A well-organized, firmly attached thrombus was found occluding the aorta at a level approximately 2.5 to 3 cm. above the point of origin of the inferior mesenteric artery. Distal propagation had taken place to the common iliac bifurcation on the right and the common femoral bifurcation on the left, in which vessels the thrombus was poorly organized and loosely attached.

There was a high degree of periarterial inflammatory reaction of the aorta and the common iliac arteries. Atheromatous changes were present in this area, and the vessels were considerably narrowed (Fig. 7).

The location of the firmly adherent, well-organized thrombus in the midportion of the subrenal aorta at the point of greatest pathologic change in the arterial wall seemed to indicate a thrombotic rather than an em-

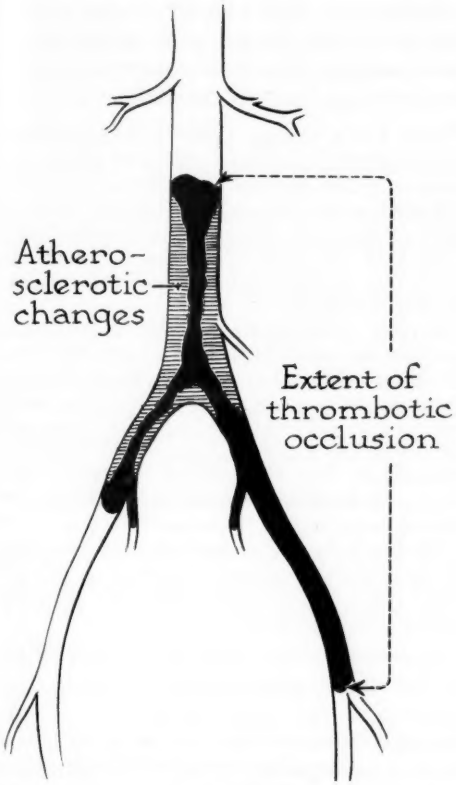

Fig. 7 (Case 7).—Acute thrombotic occlusion of the abdominal aorta with distal propagation.

bolic process. Acute ischemia was apparently initiated by occlusion of vital collaterals as the thrombus propagated distally.

Thromboendarteriectomy was performed, with complete restoration of the distal blood flow and return of the peripheral pulses.

Comment.—It is reasonable to assume that the factors precipitating thrombosis in this patient were bed rest, temporary hypotension and hypovolemia incident to acute loss of blood.

CASE 8.—A woman aged 75 complained of pain and coldness of the left leg and foot, present for ten days before admission. Calf claudication had been present for the past six months.

Examination revealed that below the knee the leg was cold and pale. The foot was cold with mottled cyanotic areas and beginning necrosis of the great, second and third toes. The femoral pulse immediately below the inguinal ligament was of normal volume. The popliteal, posterior tibial and dorsalis pedis pulses were absent. The oscillometric index was 0 at all levels below the knee.

The impression was that of beginning gangrene of the toes, with impending gangrene of the foot and severe ischemia of the leg.

Surgical exploration was made through three incisions: (1) over the common femoral artery and points of origin of the superficial and deep branches; (2) over the lower superficial femoral and popliteal via a medial thigh and popliteal approach, and (3) approaching the popliteal bifurcation from a point posterior to the posterior tibial border, immediately be-

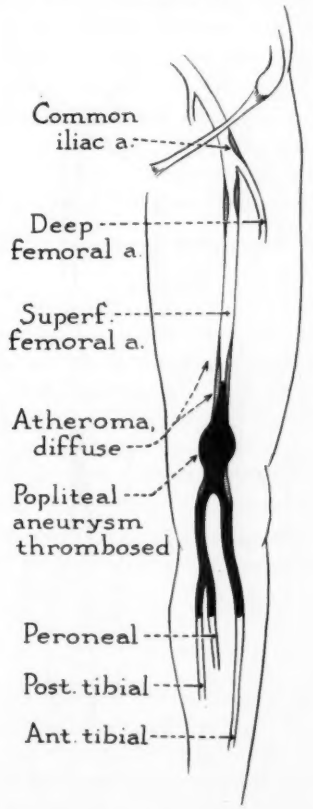

Fig. 8 (Case 8).—Diffuse atherosclerosis and thrombosed popliteal aneurysm with distal progagation of thrombus. (*Note*: Common femoral artery mislabeled common iliac.)

low the knee. Normal pulsatile flow was observed at the femoral level, although there was evidence of periarteritis and thickening of the arterial wall at this level. The popliteal artery was sclerotic and thickened throughout, with an aneurysmal dilatation of its midportion. Its occlusion was completed by a well-organized thrombus (Fig. 8). The vessels beyond the popliteal bifurcation were so nearly occluded by the diffuse sclerotic process that a polyethylene tube could be inserted only about 1 cm. beyond the bifurcation, and retrograde bleeding did not occur.

Because of the diffuse involvement beyond the popliteal bifurcation, no corrective surgical procedure was possible. Supracondylar amputation was performed.

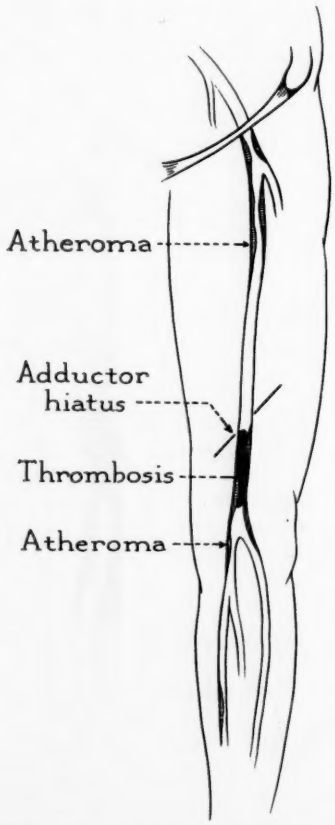

Fig. 9 (Case 9).—Sclerotic popliteal artery with secondary thrombotic occlusion. Extension of atherosclerotic process beyond the popliteal bifurcation.

Comment.—This case illustrates an advanced diffuse disease with gangrene already started in which conservative surgical therapy was not feasible.

CASE 9.—A woman aged 71 complained of pain, coldness and paresthesia of the lower portion of left leg and foot.

Examination revealed the lower half of the leg below the knee, as well as the foot, to be cold and pale. The femoral pulse was of normal volume; pulses below the femoral level were absent.

Surgical exploration revealed a thickened and sclerotic popliteal artery occluded by a thrombus (Fig. 9). After thrombectomy there was only a slight degree of back-bleeding, and a polyethylene tube was inserted with difficulty a few cm. beyond the popliteal bifurcation, the difficulty of insertion indicating an extensive diffuse distal disease of the leg vessels.

Popliteal thromboendarteriectomy was performed, with immediate restoration of the blood flow beyond the area of complete thrombotic occlusion.

Comment.—The color and temperature of the distal portion of the extremity improved, but the pedal pulses were not restored. Failure to restore the pedal pulses was to be expected, in view of extension of the atherosclerotic process beyond the popliteal bifurcation. The conclusion was that amputation was avoided as a result of the thromboendarteriectomy.

CONCLUSIONS

Acute arterial thrombosis is the major factor in the causation of gangrene in the arteriosclerotic lower extremity necessitating major amputation. Early definitive surgical intervention is indicated in these cases as a limb-saving measure.

The need for arteriographic investigation is strictly limited. This procedure may not only be misleading as a guide to surgical treatment but may jeopardize the viability of the ischemic limb by increasing vasospasm and thrombosis.

Lumbar sympathectomy is a valuable prophylactic measure to lower the incidence of gangrene in the arteriosclerotic extremity. In accordance with the concept of hematometakinesis, however, careful consideration should be given to the scope of sympathectomy, in order to avoid too wide a distribution of the vasodilatory effect with consequent deprivation of blood flow to the critical area.

Direct operation (thrombectomy or thromboendarteriectomy) may often be successfully performed. The by-pass operation is sometimes indicated.

Concomitant lumbar sympathectomy, performed with the direct operation, is an added safety factor in the event that the direct procedure is not successful.

Venous thrombosis probably coincides more frequently with arterial thrombosis than is generally realized. For this reason postoperative anticoagulant treatment is often indicated.

ZUSAMMENFASSUNG

Gleichzeitig mit dem direkten chirurgischen Eingriff eine Resektion des lumbalen Sympathicus auszuführen, bedeutet einen weiteren Sicherheitsfaktor hinzuzufügen für den Fall, dass der direkte Eingriff erfolglos ist.

Die venöse Thrombose ist häufiger mit arterieller Thrombose vergesellschaftet als allgemein anerkannt wird. Aus diesem Grunde ist die postoperative Behandlung mit koagulationshemmenden Mitteln oft angezeigt.

SCHLUSSFOLGERUNGEN

Als Ursache einer Gangrän einer arteriosklerotischen unteren Gliedmasse, die eine grössere Amputation erforderlich macht, spielt die akute arterielle Thrombose eine grössere Rolle. Um die Gliedmasse zu erhalten, ist in solchen Fällen ein entschiedener frühzeitiger chirurgischer Eingriff angezeigt.

Die Notwendigkeit arteriographischer Untersuchung ist sehr begrenzt. Dieses Verfahren kann nicht nur zu Fehlschlüssen führen sondern auch durch Steigerung von Gefässkrämpfen und Thrombosen die Lebensfähigkeit der blutarmen Gliedmasse aufs Spiel setzen.

Die Resektion des lumbalen Sympathicus ist eine wertvolle vorbeugende Massnahme zur Herabsetzung der Häufigkeit der Gangrän einer arteriosklerotischen Gliedmasse. Nach den Auffassungen der Hämatometakinese sollte jedoch der Umfang der Sympathicusresektion sorgfältig überlegt werden, um eine allzu weite Ausbreitung des gefässerweiternden Effekts mit anschliessender Verarmung der Blutzufuhr in das kritische Gebiet zu vermeiden.

Oft lässt sich mit Erfolg ein direkter chirurgischer Eingriff (Thrombektomie oder Thromboendarteriektomie) ausführen. Manchmal ist eine Umleitungsoperation angezeight.

RÉSUMÉ

La sympathectomie lombaire concomitante à une opération par voie directe, est un facteur supplémentaire de sécurité en cas d'échec de la méthode directe simple.

Il est probable que la thrombose veineuse coïncide plus souvent avec la thrombose artérielle qu'on ne l'admet généralement. C'est pourquoi il est souvent indiqué d'appliquer un traitement anticoagulant postopératoire.

CONCLUSIONS

La thrombose artérielle aiguë est le facteur causal le plus important de la gangrène des extrémités inférieures atteintes d'artériosclérose et nécessitant une amputation majeure.

La nécessité d'une artériographie est strictement limitée. L'artériographie peut être trompeuse et, de plus, compromettre

la viabilité du membre ischémié en augmentant les vasospasmes et la thrombose.

La sympathectomie lombaire est une mesure prophylactique de valeur pour diminuer le taux de fréquence de la gangrène des extrémités artériosclérotiques. Il faut cependant, selon la conception de l'hématométakinése, étudier avec une grande prudence l'ampleur de la sympathectomie afin d'éviter un effet vasodilatateur trop prononcé privant la région menacée de son apport sanguin.

Il est souvent possible de pratiquer avec succès l'opération directe (thrombectomie ou thrombo-endartérectomie).

CONCLUSIONES

La trombosis arterial aguda es la causa mas frecuente de gangrena del miembro inferior que requiere emputación. En tales casos esta indicada la intervención precoz y eficaz como medida para salvar el miembro.

La necesidad de la exploración arteriográfica debe limitarse mucho. Este método no solamente puede producir confusiones sino que además puede amenazar la viabilidad del miembro isquémico aumentando el vasoespasmo y la trombosis.

La simpatectomía lumbar es una medida profiláctica útil para reducir el número de gangrenas en las extremidades arterioescleróticas. De acuerdo con el concepto de hematometakinesis deben hacerse ciertas consideraciones en relación con el empléo de las simpatectomías con objeto de evitar una distribución demasiado amplia del efecto vasodilatador con la consecuente privación de aporte sanguineo al área isquémica.

A menudo puede llevarse a cabo conéxito una operación directa (tromectomía o tromboendoarteriectomía).

La simpatectomía lumbar concomitante con las intervenciones directas contribuye al éito cuando estas no son satisfactorias.

La trombosi venosa coincide con la trombosis arterial con mas frecuencia de lo que se crée. Por esto está indicada la terapeútica anticoagulante en el postoperatorio.

RIASSUNTO

La simpatectomia lombare, eseguita in associazione ai metodi operatori diretti, rappresenta un metodo soddisfacente nella eventualità che l'intervento diretto non sia stato efficace.

La trombosi venosa probabilmente concomita con quella arteriosa molto più spesso di quanto generalmente non si creda. Per questa ragione il trattamento anticoagulante post-operatorio è spesso indicato.

CONCLUSIONI

La trombosi arteriosa acuta è il fattore principale della gangrena negli arti inferiori arteriosclerotici che necessitano di grandi amputazioni. L'intervento chirurgico precoce viene indicato in questi casi come unico procedimento per salvare l'arto.

L'impiego dell'arteriografia è molto limitato. Questo esame può non solo essere fallace ma anche mettere a repentaglio la vitalità dell'arto ischemico aumentando il vasospasmo e la trombosi.

La simpatectomia lombare è un metodo profilattico efficace per ridurre il rischio della gangrena negli arti arteriosclerotici. In armonia con i concetti dell'ematometachinesi, tuttavia, si deve prestare molta attenzione agli scopi della simpatectomia allo scopo di evitare una troppo ampia diffusione dell'effetto vasodilatatore con conseguente deviazione del sangue lontano dall'area critica.

Interventi diretti, come la trombectomia o la tromboendarteriectomia, possono talvolta essere eseguiti con successo. Talora sono anche indicati gli interventi di bypass.

CONCLUSOES

A trombóse arterial aguda é o maior facor na causa de gangrena da extremidade inferior arterio-esclerótica necassitando maior amputação cirurgica definitiva e precose é indicada nesses casos como uma medida salvadora do membro.

A necessidade de intestigação arteriografica é estritamente limitada. Este procedimento pode ser são sómente enganador como mascarar a viabilidade do membro isquemiado por aumento do vaso espasmo e trombose.

A simpatectomia lombar é uma medida profilática valiosa para diminuir a incidencia de gangrena na extremidade arterioesclerótica. De acôrdo, porem, com o conceito de hematomecinése, devese dar atenta consideração ao escopo da simpatectomia, afim de evitar uma distribuição muito extensa do efeito vaso-dilatador com consequente diminuição de fluxo sanguineo da area critica.

As operações dirétas (trombectomias e tromboendarterectomias) podem ser realizadas com sucesso. A operação é as vezes indicada. A simpatectomia lombar feita concomitantemente com a cirurgia diréta, constitue um fator de segurança adicional no caso desta ultima não ser bem sucedida.

A trombóse venosa provavelmente coincide mais frequentemente com a trombose arterial do que comumente se imagina. Por essa razão o tratamento pós-operatório anticoagulante é frequentemente indicado.

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The mortal envelope of the Middle Age has disappeared, but the essential remains. Because the temporal disguise has fallen, the dupes of history and of its dates say that the Middle Age is dead. Does one die for changing his shirt?

—D'Aurevilly

Incivility is not a vice of the soul, but the effect of several vices—of vanity, ignorance of duty, laziness, stupidity, distraction, contempt of others, and jealousy.

—La Bruyére

There is no fact more observable in literature than how many beautiful things have been said about man in the abstract, and how few about men in particular.

—L'Estrange

Ureteral and Urethral Injuries Associated with Gynecologic and Obstetric Practice

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THE practice of gynecology, despite its great recent advances, carries with it certain operative risks which, in some cases, lead to injury of the urinary tract. This article is concerned with urethral and ureteral injuries attendant to obstetrics and gynecologic procedures, and it is our purpose to discuss some of the problems involved. Our experience has been based mainly on injuries to the ureter and bladder consequent to pelvic operations. Urethral trauma has been uncommon except for the late development of urethrocoele, with concomitant stress incontinence, after childbirth. Urethral fistula has been an extreme rarity in our hospital series of cases.

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Injuries to the urinary tract, particularly the ureter, are not infrequently associated with gynecologic surgical procedures. Injury to the urethra may also occur but is rare in current obstetric practice.

The signs and symptoms indicative of such injuries are described, and emphasis is laid on the importance of early recognition and accurate diagnosis. The authors' recommendations for management are presented and illustrated.

Ureteral Injuries.—Incidence: The incidence of ureteral injuries in gynecologic surgical practice has been estimated at 0.5 per cent to 3 per cent (Forsythe and Persky) for routine pelvic operations and as high as 30 per cent for extensive radical dissections (St. Martin). An accurate incidence is difficult to establish, since many injuries may be unrecognized, particularly when unilateral trauma has led to stricture formation and silent hydronephrosis, with eventual renal atrophy. Surgical treatment alone should not be incriminated for ureteral injuries, since radiation fibrosis, with consequent development of obstructive uropathic conditions, is an important complication of radiotherapy in gynecologic treatment (Table 1).

Etiologic Factors: Anatomically, mobility of the ureter and its long retroperi-

toneal course make it particularly liable to surgical and radiologic trauma. In addition, the frequent occurrence of such congenital anomalies, as reduplications and ectopia, further increases susceptibility to injury during operation. Staubitz has listed four important factors in the pathogenesis of these surgical accidents: (1) control of hemorrhage after slipping or breakage of a ligature, with hasty attempts to reclamp the retracted bleeding vessel without direct vision; (2) removal of large tumors when either the size of the lesion itself or the operative manipulation may alter the normal anatomic landmarks; (3) interference with ureteral blood supply without direct injury to the ureter; and (4) needle punctures, necrosis from clamps and the indiscriminate use of transfixion sutures without the benefit of direct vision. In his series of 23 ureteral injuries the highest incidence was that of injury following the Wertheim radical hysterectomy for carcinoma of the cervix. The injuries in our series have resulted, in most instances, from routine pelvic surgical procedures.

We have observed that injuries to the ureter occur most frequently at the base of the bladder or the broad ligament and, to a lesser extent, at the crossing of the iliac vessels or the ovarian fossa. In addition to localized necrosis, transection or ligation of a ureter, one should include retroperitoneal hematoma with ureteral compression as a cause of ureteral trauma, and Millin has reported 3 cases of death in anuria, in which autopsy revealed retroperitoneal hematomas compressing the ureters. In some of the more recently reported cases of periureteral fibrosis the condition may well be due to this mechanism.

Symptoms and Diagnosis: The optimum time for recognition of ureteral injury is, of course, the time of operation, when reparative measures may readily be undertaken. Leakage of urine at the operative site may be detected first, or the severed ends of a ureter may become apparent. When doubt exists as to ureteral damage, careful observation of ureteral peristalsis, with ballooning out of the ureter, may be of value in detecting obstruction; or a small slit may be made in the ureter and a ureteral catheter passed downward into the bladder. The opening is easily repaired with No. 0000 catgut. In some instances we have employed intravenous injection of idigo carmine or injection of the dye into the lumen of the ureter, to demonstrate leakage of urine caused by transection or needle puncture of a ureter. When ureteral catheters have been inserted preoperatively, ureteral injury is more readily detected. The passage of a ureteral catheter by cystoscope at the operating table has, in some cases, facilitated the diagnosis of trauma, and the retained catheter is then used for splinting the transected ureter. The distal end of a cut ureter is usually a difficult segment to locate and this method is of great aid in its detection. An alternative is opening the bladder and inserting a ureteral catheter in a retrograde fashion, to serve as a guide to the point of trauma.

TABLE 1.—*Injuries of the Urinary Tract Associated with Gynecologic or Obstetric Procedures* (Jewish General Hospital, 1935-1959)*

Type	*No. of Cases*
Ureterovaginal fistula	8
Transection of ureter	4
Bilateral ureteral ligation	2
Urethrovaginal fistula	1
Periureteral fibrosis (radiation) with hydronephrosis	3
Vesicovaginal fistula	8
Rectovesical fistula	1

*This includes 3 cases of radiation fibrosis involving the ureter.

Immediate Postoperative Period: In the immediate postoperative period there are clinical signs and symptoms which should lead the surgeon to suspect ureteral injury. The most serious is anuria or oliguria

following bilateral ligation of the ureter. This condition, however, must be differentiated from acute tubular necrosis (lower nephron nephrosis) following severe loss of blood, transfusion of incompatible blood or, in some instances, dehydration. Bilateral passage of catheters should be done immediately. If there is no obstruction, acute renal insufficiency should be suspected.

Undoubtedly there are many cases of unilateral ureteral injury in which the symptoms are mild enough to escape detection. Nevertheless, pain and tenderness in the flank, elevation in temperature, even though transitory, and increasing azotemia should act as signals pointing to ureteral damage. Of inestimable value is the intravenous pyelogram, which may show delayed excretion of the contrast medium, hydronephrosis or extravasation of dye, pointing to ureteral trauma. To supplement this, cystoscopic and ureteropyelographic studies assist in locating the exact point of obstruction and determining whether or not it is complete. The bypassing of an obstructed ureteral site may also be an important therapeutic measure, obviating the need of more extensive surgical treatment by acting as a splint to the damaged ureter.

Extravasation of urine in the immediate postoperative period may produce a critically ill patient, particularly when infected urine is retained in the retroperitoneal space. High fever, chills, reduced blood pressure and the development of paralytic ileus point to this serious complication, and the institution of proper drainage and compression, together with the administration of antibiotics and correction of electrolyte imbalance, becomes a life-saving measure.

Of most frequent occurrence in the presence of trauma to the urinary tract is leakage of urine with drainage into the vagina, onto the abdominal wall or, and more rarely, into the perineum or through enteric communications. This leakage may manifest itself in the early postoperative phase when section of the ureter occurred, or several weeks later, particularly when ischemic necrosis or partial ligation of the ureter has occurred. The differentiation from vesicovaginal fistula is easily made by intravenous urographic and cystoscopic study with intravenous injection of indigo carmine; occasionally, however, one encounters a fistula involving ureter, bladder and vagina, and recognition of this combined communication may require a more thorough investigation. In 1 of our cases slow leakage from the lower part of the ureter produced a massive false diverticulum of that segment, caused by slow accumulation of urine and the formation of a false diverticular wall therein. This extensive obstructive lesion eventually required nephrectomy.

Management.—1. *Prophylaxis*: What can be done to prevent ureteral injury during operation? There appears to be a divergence of opinion between those who employ ureteral catheters preoperatively and those who do not. In our opinion a surgical dissection in which difficulties are anticipated, or a radical pelvic operation, warrants the passage of ureteral catheters, and this has been the general practice at our hospital. In addition, a preliminary

TABLE 2.—*Methods of Treatment*

1. Nephrectomy	4 cases
2. Ureteroneocystotomy	8 cases
3. End-to-end anastomosis of ureter over splinting catheter	3 cases
4. Vaginal route for repair of urethrovaginal fistula (purse-string suture)	1 case
5. Bilateral pyelostomy followed by ureteral dilatation and ureteroneocystotomy	1 case
6. Renal decapsulation and pyelostomy	1 case
7. Transvesical bisection method for repair of vesicovaginal and rectovesical fistulas	9 cases

*This includes 4 cases in which nephrectomy was performed on elderly patients or on patients with severe renal infection. Best results were obtained by reimplantation of the ureter into the bladder.

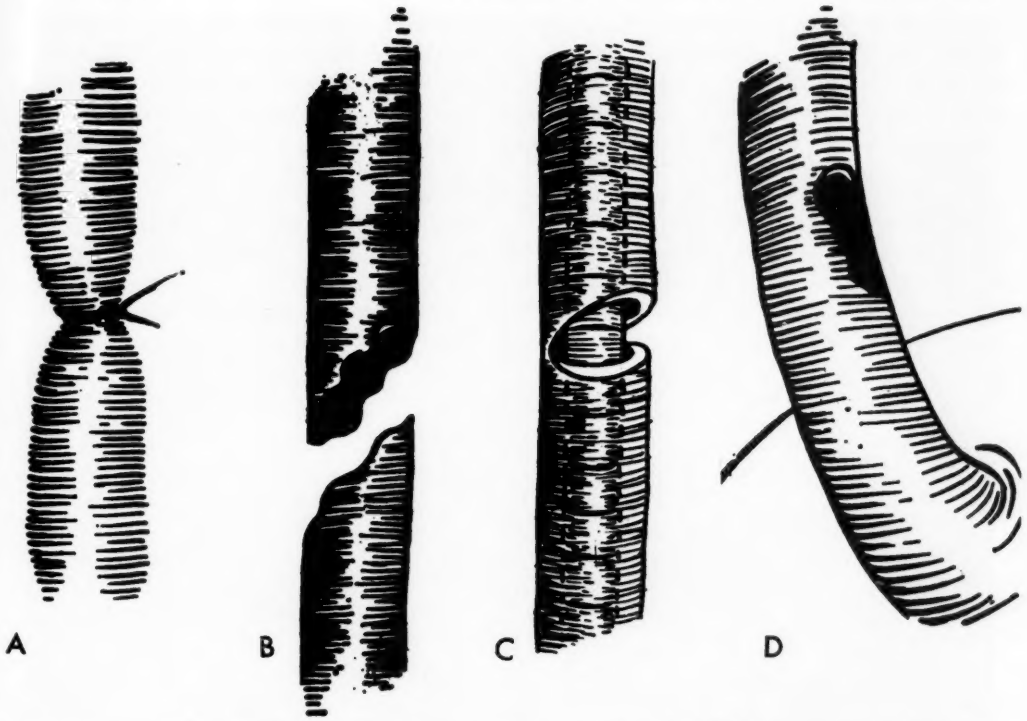

Fig. 1.—Examples of ureteral injury. *A*, ligation; *B*, transection; *C*, partial transection; *D*, necrosis.

urologic survey with intravenous pyelographic study may be of inestimable value in elucidating abnormal ureteral conditions, including the congenital anomalies that are so common. At operation the competent surgeon will carefully identify structures before clamping, dividing or ligating. When hemorrhage becomes troublesome the application of pressure with subsequent attention to individual vessels, rather than blindly applying clamps or ligatures, may help to prevent ureteral injury. Despite the rich ureteral blood supply, extensive stripping of the ureter or compression by retraction should be avoided in order to prevent ischemic necrosis. It is of interest that, when ureteral or vesical injuries occurred in our series of cases, there usually followed a period of revival of enthusiasm for the preoperative passage of ureteral catheters, which diminished with the passage of time. The value of this procedure is, however, recognized by the gynecologists on our staff, who do not hesitate to request the passage of ureteral catheters, especially when a difficult pelvic operation is anticipated.

Treatment: Immediate recognition of ureteral injury provides the most opportune time for repair. There are several technics of repair of the injured ureter, which will be described later. The method to be employed will depend on the site of injury as well as the type of trauma, e.g., ligation or transection, and also on the extent of injury to the structure (Table 2 and Fig. 2). Most injuries occur in the lowermost segment of ureter, close to the ureterovesical juncture, and in this situation deligation is generally fraught with difficulty or, if performed, results in

secondary necrosis with fistula. Of great value is the passage of a ureteral catheter from below, either by cystoscope or by opening the bladder and inserting the catheter through the ureteral orifice. This acts as a guide to the lower segment of ureter, the point of obstruction, and then as a splinting mechanism when end-to-end anastomosis is performed (Fig. 3*D*). The latter is applicable to a transected ureter, for which we perform an end-to-end anastomosis after trimming the ureteral margins in an elliptic or spatulate fashion. No. 0000 chromic catgut is then applied in interrupted sutures to the adventitia and muscularis of the ureter. Extraperitoneal drainage is mandatory for all of these injuries. The ureteral catheter is attached to a Foley catheter, which is left in the bladder and the splinting catheter is removed after eight to ten days. Recently Hamm and his associates have reported excellent results from end-to-end elliptical anastomosis without splinting, a ureterotomy being performed above the site of the suture line (Fig. 3). We have had no experience with this technic and our results and those reported by others

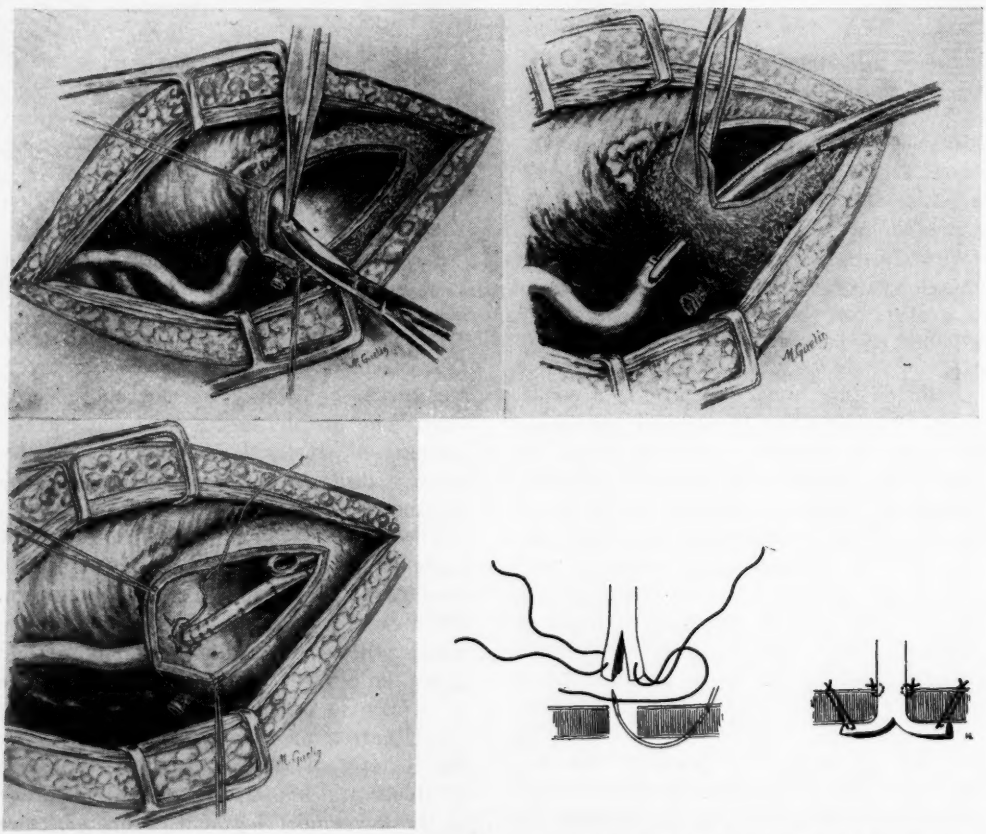

Fig. 2.—Technic of ureteroneocystotomy. Ureter is drawn into bladder through stab wound near ureteral orifice. It is then split to create two flaps, which are then sutured to the bladder wall. A ureteral splinting catheter is used for five to six days and brought through cystotomy wound alongside Pezzar tube.

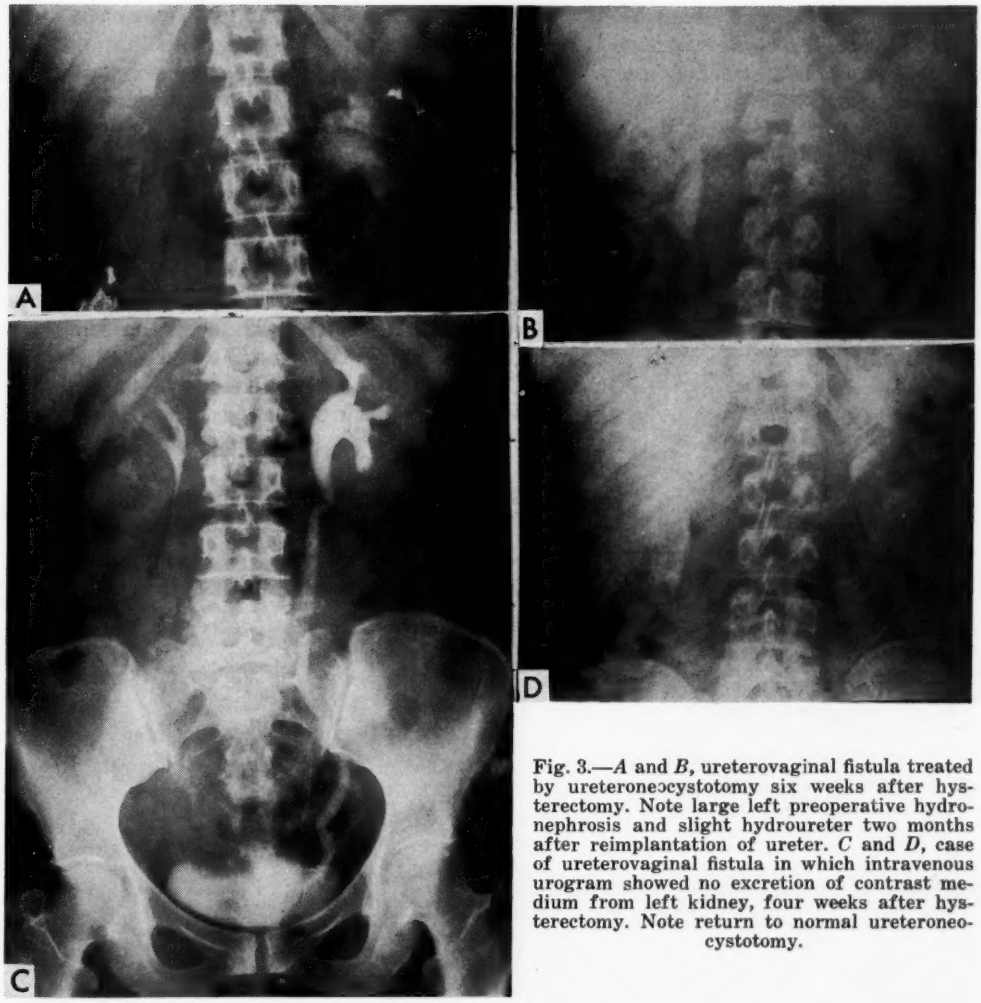

Fig. 3.—*A* and *B*, ureterovaginal fistula treated by ureteroneocystotomy six weeks after hysterectomy. Note large left preoperative hydronephrosis and slight hydroureter two months after reimplantation of ureter. *C* and *D*, case of ureterovaginal fistula in which intravenous urogram showed no excretion of contrast medium from left kidney, four weeks after hysterectomy. Note return to normal ureteroneocystotomy.

(Staubitz and others) favor continuing the use of a ureteral splint. The use of a T tube for splinting the ureter has been recommended by some surgeons, but the results do not appear to be as favorable as those obtained by using a simple soft rubber ureteral catheter splint passed upward through the ureteral orifice.

When the ureteral injury is close to the bladder and the distal stump does not lend itself to anastomosis, we perform ureteroneocystotomy, provided the extent of ureteral damage is not great enough to create tension on the proximal segment of the ureter. Our results have been best with this procedure, and the technic is simple. The bladder is opened extraperitoneally; a stab wound is made above the affected ureteral orifice, and the ureter is drawn into the bladder. The end is then split; two lateral flaps are sutured to the vesical wall with No. 000 catgut, and two anchoring sutures are placed on the outer vesical wall, between the muscularis of

the ureter and the bladder. A ureteral splint is used in all cases, drawn through the urethra and attached to a Foley catheter (Figs. 4 and 5).

When there is extensive damage to the lower end of the ureter we prefer to delay definitive repair and perform a nephrostomy if the patient's condition permits. If the patient's condition is poor, we insert a soft rubber catheter up to the renal pelvis and bring the tube out through an extraperitoneal stab wound. Ureterosigmoidostomy has been generally abandoned, and the deliberate ligation of a ureter is, in our opinion, a hazardous and unreliable procedure. There are too many instances recorded of sloughing of the suture, with fistula formation or profound sepsis in the obstructed kidney to recommend this measure, despite an occasional instance of the silent renal atrophy it is hoped to obtain.

The two principal methods of repair of extensive ureteral defects are the vesical flap technic of Ocherbad (or Boari), or the use of a segment of isolated ileum to bridge a ureteral gap (Fig. 6). The former procedure consists in creating a tubular flap from the roof of the bladder and anastomosing it to the proximal segment

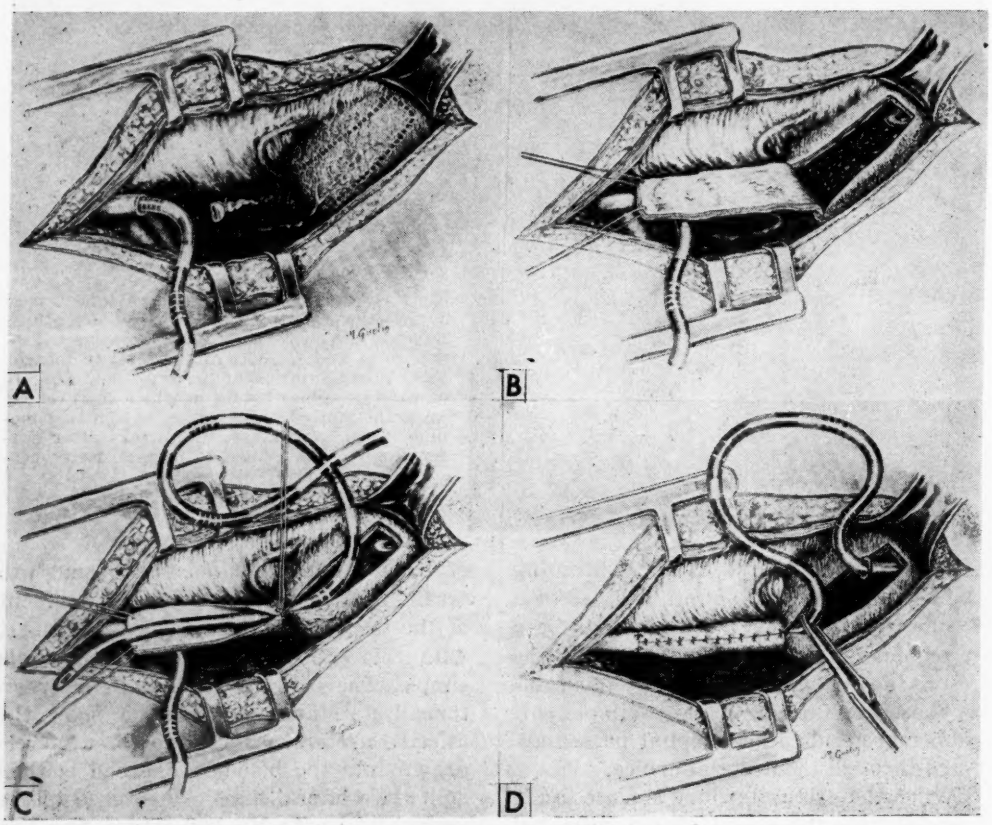

Fig. 4.—Technic of creating segment of ureter from bladder flap. Flap is outlined from posterosuperior aspect of the bladder. After ureter is fashioned it is anastomosed to proximal segment of ureter over splinting catheter.

of ureter over a splinting catheter. Its use has led to favorable results in the many cases reported. In the past few years there has been extensive use of isolated segments of large and small bowel, as substitute conduits for structures of the urinary tract (Fig. 7). In particular, replacement of an entire ureter by anastomosis of an ileal segment from the renal pelvis to the bladder has been frequently reported, as has the bridging of smaller ureteral gaps. Its applicability to the type of reparative operation necessary for ureteral trauma has been proved conclusively. It should be utilized, however, as a secondary definitive procedure, not done at the time of the initial pelvic operation in which the trauma occurs. At this time nephrostomy is still the procedure of choice, to tide the patient over until the optimum time for elective surgical intervention.

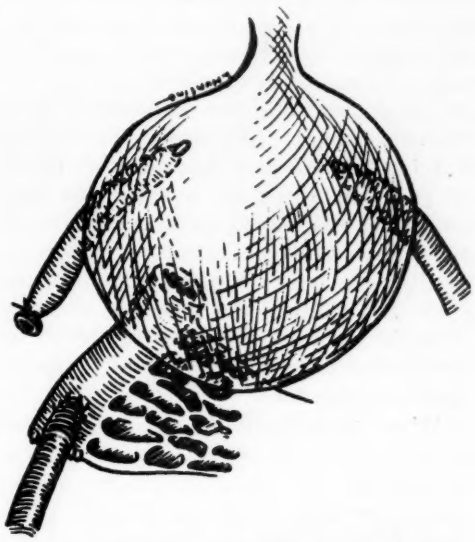

Fig. 5.—Utilization of isolated segment of ileum to bridge extensive defect in ureter.

Postoperative Care: In the immediate postoperative phase, anuria demands immediate investigation in order to eliminate the grave possibility of bilateral ureteral obstruction. Cystoscopic study with probing of the ureter readily demonstrates this condition, and immediate steps to relieve the obstruction must be taken as a life-saving measure.

Nephrostomy or pyelostomy to divert the stream of urine should be performed immediately, in order to preserve renal function and sustain life. At a later stage,

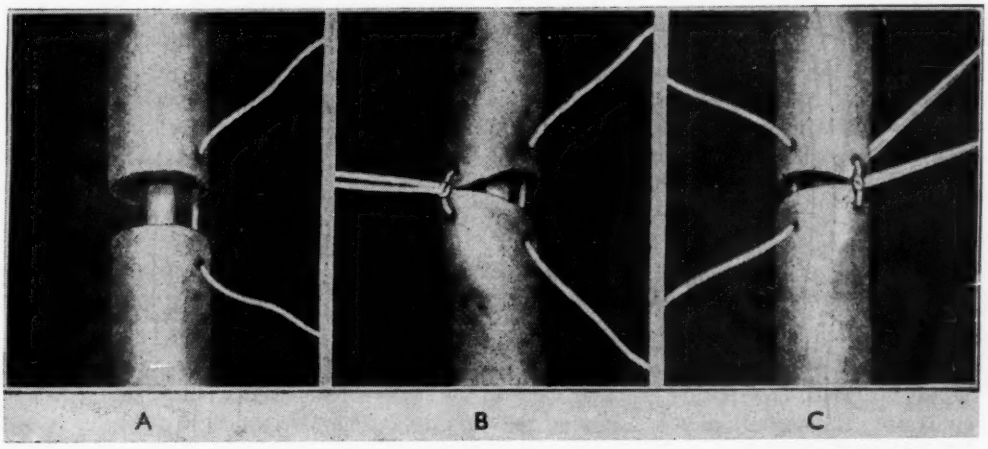

Fig. 6.—Technic of repair of transected ureter. Authors prefer to suture serosa and muscularis after ends have been spatulated.

the cystoscope and ureteral catheterization are employed in an attempt to bypass the obstruction. Failing this, ureteroneocystotomy or some other reconstructive surgical procedure is performed. It would appear from our study of this problem that deligation in the immediate postoperative phase is, generally speaking, a hazardous procedure. The patient's general condition and the usual technical difficulty involved in locating the site of obstruction at this stage may impair the patient's life. We strongly advocate diversion of the urine by nephrostomy, with a reparative operation at a later date.

When ureterovaginal or ureterocutaneous fistula develops, each case warrants individual assessment as to the treatment to be employed. When cystoscopic procedures and ureteral catheterization are successful one may be so fortunate as to obtain spontaneous closure of a fistula, especially when the ureteral catheter acts as a splint for periods up to two weeks, during which appropriate antibiotics are administered. When this is not possible, we are convinced that early definitive repair should be undertaken, in order to prevent the formation of ureteral stricture with subsequent infective hydronephrosis of the affected kidney and also to spare the patient a prolonged period of leakage of

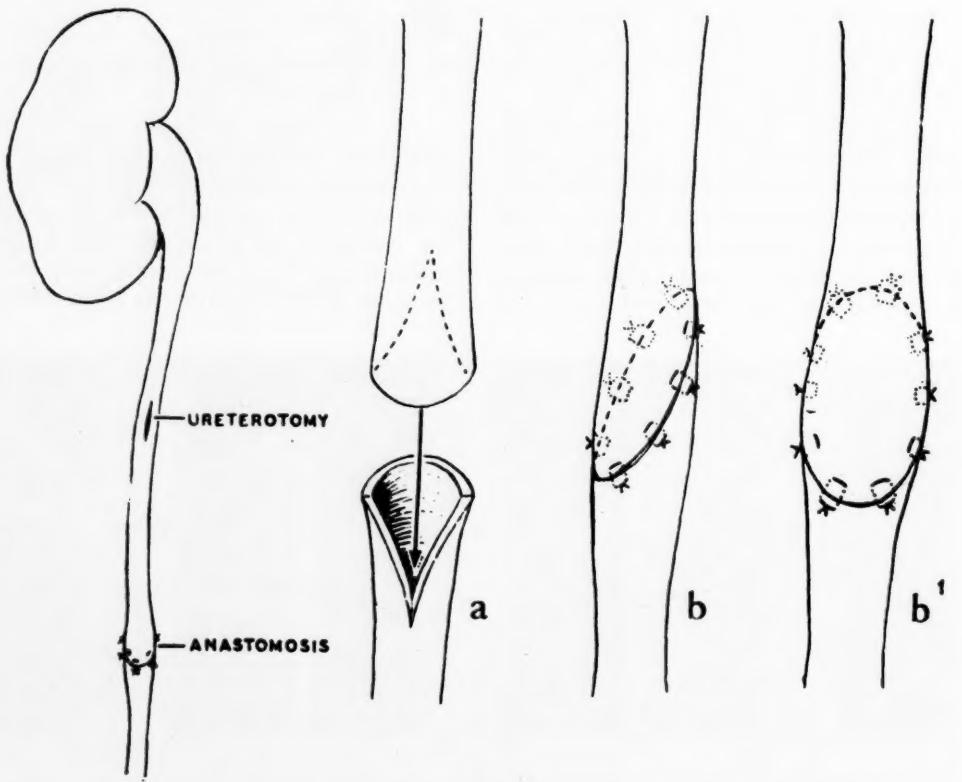

Fig. 7.—Hamm's technic of end-to-end anastomosis of transected ureter, with ureterotomy performed above anastomotic site. No splinting catheter is used.

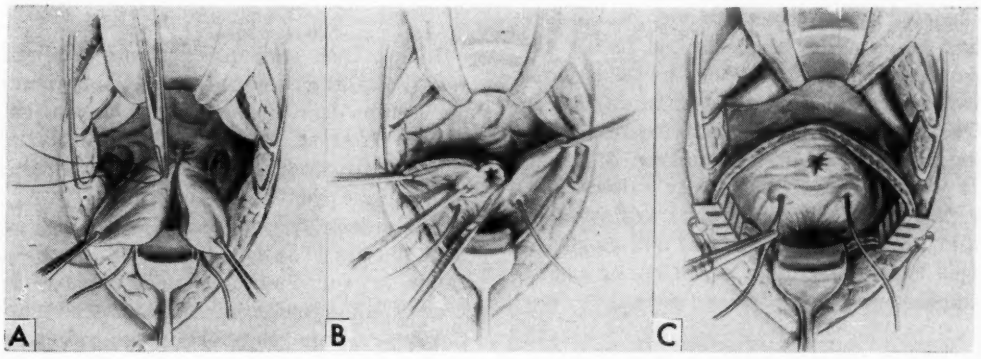

Fig. 8.—Transvesical bisection method for repair of vesicovaginal fistula. This may be applied to urethral fistula extending up into neck of bladder.

urine. The methods of repair have already been dealt with and are illustrated. Finally, good judgment will dictate that for the elderly patient, whose condition cannot bear a prolonged reparative operation, or the patient with infection already well established in a dilated, obstructed kidney, nephrectomy is treatment of choice—assuming, naturally, that the contralateral kidney is in good condition.

Urethral Injuries.—Urethral injuries are rare in modern-day obstetrics and generally follow a long period of labor with prolonged impaction of a presenting part beneath the symphysis pubis. Instrumentation in vaginal delivery may also result in urethral injury, and occasionally a urethrovaginal fistula may follow anterior colporrhaphy. This occurred in our hospital series and was the only instance of urethral injury.

If one includes under this heading the late development of urethrocoele and relaxation of the vesical neck in the parous woman, associated with troublesome stress incontinence, the problem of urethral trauma becomes much more extensive. All obstetricians and gynecologists are acquainted with the various operative methods for dealing with cystocoele, urethrocoele and rectocoele that form so large a part of gynecologic surgery. We should like to report, however, the excellent results obtained by the vesicourethral suspension operation of Marshall-Marchetti. This is usually a combined urologic and gynecologic effort at our hospital and has proved uniformly successful in cases of stress incontinence, in most of which the patient has had a course of perineal exercises and gynecologic repair from below, without any effect.

The problem of urethrovaginal fistula was uncommon in our hospital series. The urethra, in contrast to the bladder, has poor regenerative qualities, and the site and size of the defect determine the course of surgical repair. In the distal segment, when the fistula is not large, simple closure of the defect after adequate mobilization of the tissues combined with catheter drainage will usually suffice to eliminate the leakage. When the opening is in the region of the vesical neck as part of a vesicovaginal fistula, we favor retropubic exposure, with transvesical bisection of the bladder down to the fistulous orifice (Fig. 8). This approach to the repair of vesicovaginal fistula was described by one of us (G. J. S.) in 1948, before the Canadian Obstetrical and Gynaecological Society and, at about the same time, was

reported by O'Connor of Chicago. We have had 10 cases of vesicovaginal fistula successfully repaired by this method, which we reported before the Canadian Urological Society in 1958, and are extremely enthusiastic about this method of repair. It would seem to be ideally suited to the repair of a large combined vesicovaginal and urethrovaginal fistula, and closure of this type is included in O'Connor's series of cases.

ZUSAMMENFASSUNG

Verletzungen der Harnwege, besonders des Harnleiters, kommen nicht selten bei gynäkologischen chirurgischen Eingriffen vor. Verletzungen der Harnröhre können ebenfalls entstehen, sind aber in der heutigen geburtshilflichen Praxis selten.

Die Krankheitszeichen und Symptome, die auf derartige Verletzungen hinweisen, werden beschrieben. Besonderes Gewicht wird auf die Bedeutung rechtzeitiger Erkennung und genauer Diagnose gelegt. Der Verfasser stellt seine Empfehlungen zur Behandlung unter Beifügung von Illustrationen dar.

RIASSUNTO

Le operazioni chirurgiche ginecologiche non di rado si accompagnano a lesioni delle vie urinarie e soprattutto dell'uretere. Possono aversi anche lesioni dell'uretra, ma più raramente.

Vengono descritti i segni e i sintomi caratteristici di tali lesioni e sottolineata l'importanza del riconoscimento e della diagnosi precoce dell'incidente. Vengono, infine, illustrati i metodi per la cura.

RÉSUMÉ

Il n'est pas rare que des interventions chirurgicales gynécologiques entraînent des lésions des voies urinaires, en particulier de l'uretère. Il peut aussi se produire des lésions uréthrales, mais elles sont rares en pratique obstétricale courante.

Les signes et symptômes de ces lésions sont décrits; l'auteur insiste sur l'importance de leur diagnostic précoce suivi du traitement qui s'impose. Les recommandations thérapeutiques de l'auteur sont illustrées.

SUMARIO

Traumas ao tráto urinário, particularmente a ureter, são frequentemente associados a procedimentos ginecológicos cirurgicos.

Traumas a uretra podem ocorrer mas são raros na pratica obstétrica comum. Descreve os sinais e sintomas indicativos desses traumas, assinalando a importancia do reconhecimento precoce a diagnostico acurado. O autor apresenta e ilustra suas recomendações para tratamento.

RESUMEN

Las lesiones del tracto urinario, particularmente del uréter estan frecuentmente asociadas con intervenciones ginecológicas. También en la práctica obstétrica corriente puede lesionarse la uretra.

Se describen en este trabajo los signos y síntomas de estas lesiones y se llama la attención la importancia del diagnóstica exacto y precoz. El autor presenta e ilustra sus recomendaciones para el tratamiento.

Surgical Treatment of Occlusion of the Spermatic Tract

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The author examines the background of occlusion of the spermatic tract, with special mention of aspermia and azoospermia. He then discusses, sequentially, the causes of occlusion, the diagnosis and surgical treatment of occlusive aspermia and the results obtained. In his opinion, aspermia caused by occlusion, except when due to tuberculosis or to a congenital malformation, should be treated surgically. Even should the operation fail, the patient suffers no loss of sexual function. The author's best results have been obtained in cases of occlusion of the tail of the epididymis, in 50 per cent of which the operation restored the power to impregnate.

ANY therapeutic process is based on exact knowledge of the causes and diagnosis of the disease to be dealt with. Before the causes of occlusion of the spermatic tract are considered, a clear definition of two different conditions of the semen is essential. Aspermia is a total lack of both spermatozoa and cells from the germinal epithelium in the ejaculum; azoospermia means a total lack of spermatozoa despite the fact that spermocytogenic cells are present. Aspermia and azoospermia may be differentiated histologically (Joël, 1939), and this is of essential importance in the treatment of male infertility. Normal spermogenesis is not rare in cases of aspermia, but spermatozoa may be absent from the semen because the conducting tracts are occluded. On the other hand, azoospermia reveals disturbances in the various stages of the germinal epithelium while passage of the semen is free, as proved by the existence of germinal epithelial cells in the ejaculum. Thus, when testicular tissue is normal, aspermia has a more favorable prognosis than azoospermia, as the latter cannot be treated at present. Mechanical obstruction to the flow of semen can be treated surgically.

Etiologic Factors in Occlusion of the Spermatic Tract.—Occlusion of the spermatic tract may be acquired or congenital. Acquired conditions may be classified as follows:

Acquired Occlusion: This term includes (1) bilateral or unilateral occlusion of the spermatic tracts in the epididymis, of the ductus deferens or of the ejaculatory duct, due to inflammation (mainly gonorrhea, tuberculosis, parotitis epidemica with orchitis and other infectious diseases), and (2) traumatic occlusion caused by contusion, wounds or surgical operations.

Congenital Occlusion: Congenital occlusive conditions may be due to anomalies of

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the epididymis or of the ductus deferens (Momose and his associates, 1959). In this category also appear to belong microcysts and cystadenomas of the epididymis, which are often considered embryonic remnants.

Gonorrhea still takes first place among the causes of acquired occlusion of the conducting tracts though it should be pointed out that not every case of gonorrhea involves the subsequent occurrence of this condition. Owing especially to immediate antibiotic treatment, the various complications may be averted.

A further specific infectious disease of the male genital tract is tuberculosis, which has a particularly bad prognosis. The changes are mostly diffuse and affect the vesicoprostatic area, leading to obliteration of the vas deferens and the epididymis. The vas deferens is converted into a fibrous cord, and if the testicles are affected the spermogenetic tissue is mostly destroyed. Genital tuberculosis in the male is generally secondary, originating from tuberculosis of the kidneys. From this it may be seen that any surgical operation to restore fertility in cases of tuberculosis of the genital tracts has no chance of success. On the other hand, occlusions caused by specific infections (Staphylococcus, Bacillus coli, etc.) and mostly restricted to the tail of the epididymis are particularly suitable for vasoepididymostomy.

The second group of acquired pathologic conditions is traumatic. Occlusion may be due to accidental damage to the vas deferens; for example, ligation and cutting of the vas in herniotomy or some other operation, injury to the epididymis and the vasa due to accident (and war injuries), as well as intentional damage—for example, the sterilizing operation, consisting of ligation of the vasa, frequently performed under the Nazi regime. Bilateral lesions of the vas deferens incurred in herniotomy cause sterility. Occlusion of the vas deferens also as a consequence of the surgical treatment of chronic vesiculitis (the so-called Belfield's operation), recommended by some authors, has also been observed. Patency can be tested only during operation, since the slightest trauma to the vas deferens may lead to occlusion.

As regards the causes of congenital occlusive sterility, a number of interesting anomalies affect both the epididymis and the vas deferens. I had the opportunity during operation to observe, in members of two generations of the same family, bilateral aplasia of the vasa deferentia. In 1957 I had the opportunity of observing, in addition to aplasia of the ductus deferens, a biliteral absence of the epididymis (M. Komase, 1959).

Occlusion of the conducting spermatic tracts may also be caused by the microcysts and cystadenomas already mentioned. In these circumstances the patient is a suitable candidate for vasoepididymostomy.

Diagnosis of Occlusive Aspermia.—Besides the aspermia that occurs as a result of insufficiency of germinal tissue in cases of hypogonadism or other degenerative conditions, there are a number of cases, as has been mentioned, in which the testicular tissue is completely normal. In order to diagnose this condition biopsy of the testis is performed. From the testicular biopsy, the essential facts pertinent to basic treatment are derived. Exact knowledge of the histophysiologic and histopathologic character of the testes is important. Surgical correction can be successful only if spermatogenesis within the testes is absolutely normal.

Concerning diagnosis of the occlusion itself, the technic has been broadened by the development of urethrographic technics (Brodny), e.g., vasographic and epididymographic studies in which the con-

trast medium reveals strictures in the roentgenogram.

Surgical Treatment of Occlusive Aspermia.—One may operate if two conditions are present, as follows: (1) There is normal spermatogenesis in the testes, with spermatozoa being present proximal to the point of occlusion, and (2) the spermatic tracts distal to the point of occlusion are patent. Apart from these factors, which refer directly to the patient to be operated upon, thorough examination of the wife is indicated, and her ability to conceive (determined by means of pertubation or hysterosalpingographic study and endometrial biopsy), must be proved prior to the operation on the husband. The condition of the testes must be clarified by means of biopsy. Patency of the spermatic tracts must be tested during the operation by careful catheterization with a thin nylon thread on methylene blue. The operation must be chosen according to the site of the occlusion. I am in a position to report, on the basis of personal experience, the indications for three types of operation that offer a chance of success:

1. *Vasoepididymostomy:* This is suitable in cases of occlusion of the tail of the epididymis or of the proximal part of the ductus deferens.

2. *Epididymotestostomy:* This procedure is applicable in cases of occlusion of the head of the epididymis.

3. *Vasotestostomy:* In cases of complete obliteration of the epididymis, vasotestostomy should be done.

Up to the year 1940, F. R. Hagner, of the United States, had recorded the best results, since he was able to report the largest number of operations (85 in all). In 45 cases he was able to perform vasoepididymostomy. In 26 of the 45 patients there was normospermia in the ejaculum, and 20 wives became pregnant and bore 1 to 6 children. Hotchkiss announced success in 20 per cent of cases. Bayle reported that since 1934, in a total of 113 operations with anastomosis, he performed vasoepididymostomy in 84 cases. Out of 65 cases of aspermia, the condition was cured in 43.

In 71 operations performed by myself, in 70 cases in Israel, aplasia of the ductus deferens was observed in 16; in 8 there was left-sided or right-sided aplasia of the ductus deferens. In 2 cases unilateral cryptorchidism was noted, with aplasia of the ductus deferens on the other side; and in 2 cases, in addition to aplasia of the ductus deferens, there was bilateral absence of the epididymis. As for the remaining 42 cases, I succeeded in 21 in securing normal discharge of the semen. The wives of 9 of the patients became pregnant within two months to two years after the operation. Altogether there were 12 births; 2 abortions occurred, in the second and third months of pregnancy respectively. Up to the time of writing one couple has 3 children, two couples have 2 each and 5 couples have 1 child only. The ages of the men operated upon varied between 22 and 45 years. The oldest of the wives was 40 years of age.

On the basis of experiences gained, we may assume that aspermia caused by occlusion of the spermatic tracts (excepting cases in which tuberculosis or congenital malformation is the cause) should be treated surgically. Even if the operation does not succeed and the patient remains aspermic, his sexual functions do not suffer. There are almost no complications; I personally encountered none. The best results are to be achieved in cases of occlusion of the tail of the epididymis. The patient has nothing to lose by this operation, and he has the chance of having his ability to impregnate restored in 50 per cent of cases. This is the highest ratio of success that can be reached at present in the treatment of male sterility.

When biopsy shows an absolutely normal condition of the testis and there is no tuberculosis, surgical exploration is recommended. In spite of the modest results achieved by surgical treatment of male sterility, it is nevertheless one of the most gratifying tasks of seminology to assist persons who would otherwise have remained childless in having the children they crave.

ZUSAMMENFASSUNG

Der Verfasser untersucht die symptomatik des Verschlusses der Samenleiter unter Hervorhebung der Aspermie und der Azoospermie. Anschliessend erörtert er die Ursachen des Verschlusses und die Diagnostik und chirurgische Behandlung der dadurch hervorgerufenen Aspermie sowie die erzielten Resultate. Er ist der Ansicht, dass die durch Verschluss entstandene Aspermie mit Ausnahme der tuberkulösen und kongenitalen Fälle chirurgisch behandelt werden sollte. Die Geschlechtsfunktion des Kranken leidet nicht, auch wenn die Operation misslingt. Die besten Resultate erzielte der Verfasser in Fällen bei Verschluss des Schwanzes des Nebenhodens, wo es in fünfzig Prozent gelang, mit Hilfe der Operation die Befruchtungsfähigkeit wiederherzustellen.

RÉSUMÉ

L'auteur étudie la symptomatologie de l'occlusion de la voie spermatique, insistant particulièrement sur l'aspermie et l'azoospermie. Puis il discute successivement les causes de l'occlusion, le diagnostic et le traitement chirurgical de l'aspermie occlusive et les résultats obtenus. Il estime que l'aspermie est du ressort de la chirurgie, sauf lorsqu'elle est d'origine tuberculeuse ou due à une malformation congénitale. Même en cas d'échec opératoire il ne s'ensuit aucune diminution de la fonction sexuelle. L'auteur a obtenu ses meilleurs résultats dans les cas d'occlusion de la queue de l'épididyme; dans 50% des cas l'opération a permis la restauration du pouvoir de fécondation.

RESUMEN

El autor examina la etiología de las oclusiones del conducto deferente mencionando también los casos de aspermia y de azoospermia. A continuación enumera las causas de la oclusión, el diagnóstico y el tratamiento quirúrgico de la aspermia obstructiva y los resultados que se obtiénen con el mismo. Opina que la aspermia obstructiva debe tratarse siempre quirúrgicamente salvo que sea congénita o fímica. Aunque fallase la operación el enfermo no pierde la potencia sexual. Los mejores resultados han sido obtenidos en casos de oclusión de la cola del epidídimo, en la mitad de los cuales la operación restableció la fertilidad.

SUMARIO

O A. examina as bases cientificas da oclusão do conduto espermático, com especial menção à aspermia e azospermia. Discute, em seguida, suas causas, diagnóstico e tratamento cirurgico da aspermia oclusiva e os resultados obtidos. Em sua opinião, a aspermia causada por oclusão, excepto quando devida tubercolose ou à malformação congênita deveser tratada cirurgicamente. Mesmo que a operação fracasse, o paciente não sofrerá perda de função sexual. Os melhores resultados do A. foram obtidos em casos de oclusão de cauda do epidídimo, em 50% dosquais a operação restaurou o poder germinativo.

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Science, which seeks a definite answer to a general question, just as medicine requires a definite decision in a given case, must be reconciled with the humanities, if an intellectual equilibrium is to be established.

The excessive specialization that prevails in the field of medicine is compensated by a tendency to synthesize in the field of research. Specializations are regrouping themselves under new banners, although in some cases, as in the neuropsychiatric combination, they are new only because, faded by the sun of centuries, their original colors can no longer be distinguished. A cry for integration and universality fills the laboratories. The mind of the investigator is becoming a small firmament with a central sun of interest in one subject, but surrounded by many stars of diverse scientific interests. The research worker, having gone beyond the purely microchemical and analytic thought of the nineteenth century, once again becomes a philosopher. But his philosophy is that of an investigator whose mind is broad and free and whose purpose is to apply his discoveries to the art of healing. Fleming, a pure researcher, gave Florey, the clinician, a magic tool with which to write another page in medical art. The medical investigator who studies pathologic anatomy knows that, as William Osler recommended, the hospital and the medical faculty are centered around the humble marble of their dissecting table. Investigators can no longer ignore what is happening in other fields of modern science. A fine spirit of collaboration unites researchers from any area of medicine. From the merging of the work of physicists, bacteriologists, and electrotechnicians has risen the portentous electron microscope. The joint efforts of bacteriologists, biochemists, and clinicians led to the discovery of the new sulfonamides. Mycologists and veterinarians, chemists and pharmacologists, are wresting from the sphinx of nature the secret of antibiotics. The accumulated knowledge of entomologists, parasitologists, and biologists is yielding the new antimalarials.

—*Marti-Ibañez*

Intrapartum Bleeding

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IT GOES without saying that obstetricians, by the very nature of their professions, are deeply concerned with the causes, characteristics, symptoms, diagnosis and management of intrapartum hemorrhage. They are equally interested in any observation or discovery in any of these areas that promises to reduce the maternal and fetal mortality rates associated with such hemorrhage. Next best, presumably, to supplying new and significant knowledge of the problem is the summation and analysis of the facts already known, in order that all obstetricians may be fully informed and kept alert to the necessity of adapting suitable forms of therapy to the major types of intrapartum bleeding, the conditions in which their occurrence is most probable and the possible dangers to maternal and fetal life involved therein.

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The author discusses the incidence, causes and management of intrapartum hemorrhage, with special reference to abruptio placentae, placenta praevia and rupture of the uterus. He points out that, although the mortality rate associated with infection and toxemia has been greatly reduced, that of intrapartum hemorrhage has been steadily increasing. Various current theories of management and certain possible improvements derived from recent research are discussed.

Although the incidence of maternal death due to the notorious triad hemorrhage, infection and toxemia has been greatly reduced in the past twenty-five years, the percentage of such deaths caused by hemorrhage has been steadily increasing. The incidence of maternal death per 10,000 live births is shown in the accompanying chart: statistics from the state of New York (1954 to 1958) are presented in Table 1 and the usual causes of maternal death in Table 2.

As has been stressed by Eastman and many others, hemorrhage directly or indirectly accounts for more than 50 per cent of all maternal deaths.

The 75 deaths due to hemorrhage in the State of New York in 1957 are here broken down (Table 3).

This article, however, deals chiefly with intrapartum hemorrhage. The more important causes are shown in Table 4.

Other causes of less maternal importance but in many instances equally tragic from the infant's standpoint, are as follows: (1) rupture vasa praevia; (2) rupture of varix or short cord; (3) rupture of placental hemangioma; (4) rupture of fetal vessel of plaque; (5) rupture of

varix of vulva; (6) bleeding carcinoma of the cervix; (7) benign cervical and vaginal lesions, polyps, etc., and (8) lacerations of the cervix, vagina and perineum.

Abruptio Placentae—I shall limit my discussion to the important causes. *Abruptio placentae* is one of the most serious accidents encountered in present-day obstetrics. In Barry and Feeney's series of more than 3,000 cases occurring in nearly 300,000 deliveries, abruptio placentae accounted for 106 maternal and 1,600 fetal deaths. Fifty per cent of the maternal deaths were attributed directly to hemorrhage; 25 per cent to hemorrhage plus renal failure and 25 per cent to hemorrhage plus associated conditions, such as toxemia, infection and apoplexy.

Over a period of twenty-five years the maternal mortality rate was reduced from 6.2 per cent in the first five-year period to 1.2 per cent in the last. This great improvement is due to several factors: (1) more liberal use of blood; (2) recognition and treatment of hypofibrinogenemia; (3) the modern trend toward conservative management; (4) improved anesthesia; (5) improved surgical technic, and (6) the use of antibiotics.

It is variously reported that abruptio placentae in 25 to 60 per cent of cases is associated with toxemia or hypertension. It follows then, that proper management of the toxemias is an aid in the prophylaxis of abruptio placentae.

What is being done to prevent this tragedy in the other 40 to 75 per cent of cases in which the cause may be obscure? There are numerous research projects now in progress. These deal with varying aspects of the uterine and placental venous blood flow as related to toxemia, as well as with abruptio without toxemia. It is postulated that retarded venous flow and increased venous pressure at the placental site are responsible in some cases. It is easily demonstrated in dogs that occlusion or ligation of the vena cava results in retroplacental hemorrhage and separation. Mengert has produced abruptio placentae in 2 patients at the time of cesarean section by compressing the vena cava.

TABLE 1.—*New York State Statistics 1954-1958*

Year	*Births*	*Maternal Deaths*	*Rate, %*
1954	334,659	153	4.4
1955	340,525	137	3.9
1956	345,103	121	3.4
1957	360,731	176	4.4
1958	358,790	145	3.9

TABLE 2.—*Causes of Maternal Mortality, 1957 (176 Deaths)*

	No. of Deaths	*Mortality Rate, %*
Hemorrhage	75	43
Infection	42	24
Toxemia	23	13
Embolism	9	5
Cerebral hemorrhage	1	0.5
Others causes, not well defined	26	14.5
Totals	176	100

TABLE 3.—*Etiologic Data on 75 Deaths Due to Hemorrhage, New York, 1957*

Postpartum bleeding	18
Abortion	17
Ectopic pregnancy	15
Placenta praevia & other antepartum conditions	1
Retained placenta	4
Trauma	7
Other causes	3
Total	75

TABLE 4.—*Major Causes of Intrapartum Bleeding*

	Incidence
Abruptio placentae	1.85 in 250
Placenta praevia	1 in 200
Rupture of uterus	1 in 1,700
Marginal sinus	1 in 33-100

Pressure of the enlarged, heavy uterus on the vena cava has occasionally caused exactly the same condition. If this alone is responsible it is amazing that abruptio placentae does not occur more commonly. Obviously, there are other factors involved that obstetricians do not completely understand. Time will tell whether the current investigations will eventually make it possible to treat idiopathic abruptio placentae prophylactically; meanwhile, this result can only be hoped for, and all obstetricians must be on the alert to recognize the condition promptly and realize its seriousness, particularly to the infant.

The research along these lines with which I am most familiar is that done by Howard, Goodson and Mengert and, more recently, by Nesbitt, Powers, Boba and Stein of Albany (experimental production of abruptio placentae in dogs). These projects have not explained the entire etiologic complex of abruptio placentae but have significantly increased the current knowledge of its background. In my opinion, one of the important observations of Nesbitt and his associates is that renal damage, i.e., distal tubular necrosis, occurred uniformly in pregnant dogs after occlusion of the vena cava and did *not* occur in the nonpregnant control dogs. This seems to confirm the old hypothesis that toxic pressor substances are liberated into the blood stream from the damaged placental site and are responsible for arteriolar vasospasm, increased renal vascular pressure, decreased renal blood flow, renal anoxia, tubular necrosis and oliguria.

Another important observation, and one that promises to prove clinically rather important to obstetricians is the effect of Arfonad on these animals. It was noted that this ganglionic blocking agent (trimethaphan camphorsulfonate) had the effect of lowering the arterial pressure *and also the venous pressure.* This reduced the venous engorgement of the uterus and significantly reduced the number and degree of placental separations. Furthermore, it prevented the renal changes aforedescribed, even though the vena cava was occluded in the same dogs.

Nesbitt and Powers pointed out that Arfonad probably has a specific protective action on the renal tubules that is identical to acute denervation of the kidney. Both prevent arteriolar vasospasm and the well-known chain of events responsible for anoxia and tubular necrosis.

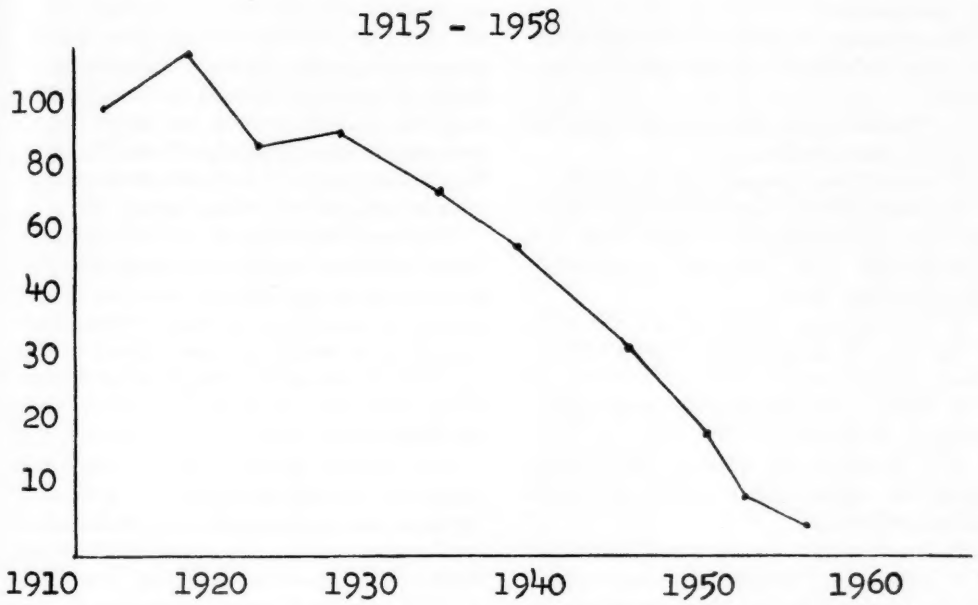
Now what may be the clinical significance of these observations? In cases of severe abruptio placentae in which the fetus is dead or in the patient after the uterus has been emptied, it may be discovered that shock and renal tubular necrosis can be prevented or favorably treated with Arfonad or allied drugs that block the autonomic nervous system.

The use of ganglionic blocking agents while the living fetus is still *in utero* might cause meconium ileus or other neural disturbances. With this in mind, and until more is learned about the effects of this drug on the fetus, it should be used only post partum or when the fetus is already dead.

As yet, Arfonad has not been used clinically for abruptio placentae in the institution I serve, but it has been used successfully in the treatment of a variety of other clinical conditions of which shock and acute tubular necrosis are common complications.

Management: The management of abruptio placentae may be outlined as follows:

1. Draw blood; check hemoglobin; crossmatch 3 pints.
2. Observe clotting.
3. Administer blood by continuous intravenous injection with an 18-gauge needle.
4. Check the maternal blood pressure and



National maternal mortality rate: Number of death per 10,000 live births.

the fetal heartbeat every fifteen minutes.

5. Administer morphine for shock.
6. Send a catheterized specimen of urine to the laboratory for analysis.
7. Follow closely the output of urine.
8. Alert the staff of the operating room.
9. Use O-negative blood with Witebsky's substance added, if the correct type is not available.
10. Administer fibrinogen, 2 Gm., if needed.
11. Perform a sterile vaginal examination (a) to confirm the diagnosis, (b) to appraise the condition of the cervix and (c) to rupture the membranes if the patient is in labor or the condition of the cervix favorable.
12. Infuse pitocin to speed labor, especially if the patient is a multipara.
13. Perform a cesarean section if the bleeding is severe and there is a good chance of fetal salvage.
14. In the absence of a fetal heartbeat, treat the hemorrhage, etc., and deliver the fetus vaginally if at all possible.

Placenta Praevia.—The second most important cause of intrapartum bleeding is *placenta praevia*. The diagnosis and management of this condition have been improved in some respects, as is indicated by lowered maternal and fetal mortality rates. Obstetricians are still looking for a more refined and reliable method of localizing the placenta. In my own experience, soft tissue technics and cystograms have not been as reliable as they are reported to be. I find myself relying more on the history of painless bleeding in the third trimester, usually in a multipara with a high presenting part, sometimes with lateral displacement or some more pronounced malpresentation. Characteristically there is no increase in uterine tonus. I base my final diagnosis in most instances on the results of a sterile vagi-

nal examination.

Management: In cases of placenta praevia, the following suggestions are pertinent:

1. Hospitalize the patient without rectal or pelvic examination.
2. Make blood immediately available.
3. Order bed rest and conservative management. (This applies in most cases, but management must, of course, be suited to the individual case.)
4. Deliver after the thirty-seventh week if the fetus is good-sized (taking precautions against error).
5. Make placentographic and cystographic studies.*
6. If forced to act quickly, use a double setup for vaginal examination and surgical intervention.
7. Rupture the membranes if possible.
8. With a central type of presentation or if the bleeding is too brisk, perform cesarean section.

I am strongly convinced that conservative management, sometimes called "intelligent procrastination," in selected cases is highly important. Such cases probably represent more than 50 per cent of those encountered, and conservatism has been responsible for the great improvement in the fetal mortality rate. Loss of the fetus in about 50 per cent of the cases is due to prematurity, and the only way to obviate this is to carry the patients a few weeks closer to term; follow the blood cell count carefully; replace blood as needed, but delay delivery if at all possible until the patient is in the thirty-seventh to the thirty-eighth week.

Comments on Placenta Praevia.—The first hemorrhage is rarely if ever fatal. Neither the vagina nor the cervix should be packed; this increases bleeding. Since 50 per cent of fetal deaths are due to prematurity, conservation management reduces fetal loss. Cesarean section, preferably the classic type, is indicated in 50 per cent of cases. The use of Voorhees bag, the Willett forceps and the Braxton-Hix type of version are losing favor.

Rupture of the Uterus.—This is the next major cause of intrapartum and postpartum bleeding and carries with it a high maternal and fetal mortality rate. Fortunately, it occurs in only about 1 case in 1,700. Even at this figure, most institutions deal with an average of 1 or more ruptures every year.

The clinical picture may be most dramatic but is not uniformly so. All obstetricians are familiar with the classic signs and symptoms as described in the textbooks. An important warning voiced by Golden and Betson is to remember to look for them and to act promptly. Early diagnosis and treatment are imperative.

These authors summarized their 23 cases in the *Green Journal* for April 1960. The major symptoms in their 17 cases of complete rupture are shown in Table 5.

The predisposing factors are as follows: (1) previous cesarean section; (2) previous trauma by forceps, version or manual extraction of the placenta; (3) previous myomectomy; (4) previous uterine infection (puerperal, postabortal); (5) multiparity, and (6) congenital uterine anomalies.

Management.—The management of rupture of the uterus is as follows:

1. Anticipate rupture if predisposing factors exist.

TABLE 5.—*Complete Rupture of Uterus in 17 Cases (Holden and Betson)*

1. Pain	60%
2. Fetal death	60%
3. Shock	53%
4. External bleeding	48%
5. Cessation of labor	25%
6. Palpable fetal pulses	20%

*I have had no clinical experience with pelvic arteriographic study as described by Richard Bernstine and his associaties but can see that it seems to offer some real advantages over other methods of locating the placenta.

The use of intravenous radioactive sodium has certain theoretical disadvantages. Some intravenous method in which a radiopaque medium is employed would probably be easier to carry out. I understand that research work along this line is now in progress.

2. Prevent by choosing the proper obstetric procedure. Cesarean section is advisable in (a) cases of disproportion; (b) cases in which this operation has been done before, and (c) cases of a transverse lie, in which it is preferable to version and breech extraction.

3. Be suspicious of lower uterine tenderness and a thinning lower segment.

4. Examine the vagina immediately; examine the uterus after operative vaginal delivery or when brisk vaginal bleeding occurs in the absence of uterine atony.

5. Transfuse adequately and rapidly, arterially if necessary. Perform exploratory laparotomy if rupture exists or is strongly suspected.

7. Perform total hysterectomy.

8. Administer antibiotics and fibrinogen as needed.

ZUSAMMENFASSUNG

Der Verfasser erörtert die Häufigkeit, die Ursachen und die Behandlung von Blutungen während der Entbindung mit besonderer Berücksichtigung der Ablösung der Plazenta, der Placenta praevia und des Gebärmutterrisses. Er weist daraufhin, dass, während die Sterblichkeit durch Infektion und Schwangerschaftstoxikose erheblich gesunken ist, die infolge von Blutungen bei der Entbindung ständig ansteigt. Verschiedene laufende Theorien der Behandlung und gewisse aus neueren Forschungen stammende mögliche Verbesserungen werden erörtert.

RÉSUMÉ

L'auteur étudie la fréquence, les causes et le traitement de l'hémorragie intrapartum; une mention spéciale est accordée au placenta abruptio, au placenta praevia et à la rupture de l'utérus. Il signale que, malgré que le taux de mortalité dû aux états infectieux et à la toxémie ait beaucoup diminué, l'hémorragie intrapartum n'a cessé d'augmenter. L'auteur discute diverses théories thérapeutiques et certaines améliorations possibles grâce aux progrès de la recherche moderne.

RIASSUNTO

L'autore discute la frequenza, le cause e il trattamento dell'emorragia nel corso del parto, con particolare riguardo alla rottura di placenta, alla placenta previa e alla rottura di utero. Egli fa rilevare come, accanto ad una notevole riduzione della mortalità legata alle infezioni e alla tossiemia, si sia avuto un sensibile aumento di quella in rapporto con le emorragie intra-partum. Discute, quindi, le numerose teorie moderne sul trattamento e i miglioramenti derivati dalle ricerche più recenti.

RESUMEN

El autor trata sobre la frecuencia, causas y tratamiento de las hemorragias intrapartum con especial referencia a la abruptio placentae placenta previa y ruptura del útero. También hace notar que aunque la cifra de mortalidad por infección y toxemia ha decrecido considerablemente en cambio la debida a la hemorragia intapartum ha seguido aumentando. Por ultimo hace consideraciones sobre diferentes teorias del tratamiento y sobre posibles mejorías derivadas de investigaciones recientes.

SUMARIO

O autor discute a incidência, causas e tratamento da hemorragia intra-partum, com referencia especial a placenta abruptio, placenta prévia e rutura do utero. Assinala que embora o gráu de natalidade associada com infecção e toxemia tenha sido grandemente reduzida, a hemorragia intra-partum tem aumentado grandemente. Varias teorias correntes de tratamento e possiveis progressos advindos de pesquisas recentes são discutidas.

Do "Above-Elbow Amputees" Use Their Prostheses?

A Clinical Study*

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*This study was conducted by the authors as Chief and member (respectively) of the Orthopaedic and Prosthetic Appliance Clinic Team, Veterans Benefits Office, Washington, D.C., but does not necessarily imply the approval or official opinion of the Veterans Administration.

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The full-time and part-time use of artificial arm prostheses by persons who have undergone amputation above the elbow is discussed, with particular emphasis on the individual problems involved and the adaptation of rehabilitative measures, as well as of the prostheses themselves, to the individual case. By a concerted effort on the part of the rehabilitative team, a patient who has long since discarded a prosthesis that has proved troublesome to him, can frequently be persuaded to accept a modern device and cooperate with the therapist in learning how to use it. The results, although not ideal in some cases, are highly encouraging.

IT is generally believed that most persons who have lost an arm above the elbow do not habitually use the prostheses with which they have been supplied. This idea has been fostered by the many empty coat sleeves commonly noted among arm amputees seen before World War II. The development of prostheses was considerably accelerated by the great number of amputations resulting from mines and high velocity missiles in World War II and the Korean conflict, and the resultant stimulus to prosthetic research, but unfilled, pinned coat sleeves are still noted.

There is little resistance among amputees to the use of leg prostheses, because of the imperative need of their aid in the functions of weight bearing and ambulation. Without a prosthesis the leg amputee is severely handicapped and must have either crutches or a wheel chair in order to move about. A unilateral arm amputee, however, has an entirely different handicap, part of which he may overcome, with his normal opposite arm. Most arm functions use one extremity as the active force, the right if the person is right-handed, the opposite arm being used

to assist. The stump of an amputated arm is sometimes adequate to assist the intact arm in many, though of course not all, activities. The amputee may improve this function by constant use, thereby increasing his own resistance to the use of an artificial device except for cosmetic purposes. This does not apply to bilateral arm amputees, who of necessity must use an artificial appliance to perform most physical functions.

It is generally known that the more distal an arm amputation the more frequent is the use of the prosthesis with which it has been fitted. Thus, wrist disarticulation and forearm amputees are more common prosthetic users than above-elbow or shoulder disarticulation amputees. The smaller and lighter prosthesis, and the intact elbow joint, with resultant ease of control, obviously constitute a decidedly less handicap to overcome. However, in view of the many significant advances made in the construction and fitting of upper extremity prostheses in the past 10 years, as a result of many artificial limb research projects sponsored by the National Research Council, the Veterans Administration, and commercial prosthetic firms, it was thought that above-elbow amputees might now be using their prostheses more frequently than commonly believed.

Accordingly, the Orthopaedic and Prosthetic Appliance Clinic Team of the Veterans Benefits Office, Washington, D.C., headed by the senior author, decided early in 1959 to review all above-elbow amputees who had previously visited their clinic. It was believed that through such a review that the clinic could determine not only the current use of prostheses then in their possession, but also the need of adjustments, modifications, terminal devices, or even new prostheses which might facilitate their use. Since the Clinic's previous experience had shown the repeated non-use of such prostheses after their initial issuance, it was hoped to determine whether this was due to medical problems, mechanical difficulties, personality complexes, psychiatric factors, or other reasons. Furthermore, the prosthetic industry had made great strides in recent years in the improvement of upper extremity appliances, and since most of our veterans had incurred their injuries in World War II and had received their prostheses shortly thereafter, an added purpose of the follow-up campaign was to acquaint any veterans who had not been coming to the Clinic regularly with such recent improvements.

The medical social worker, a regular member of the Clinic Team, was designated to contact these veterans to induce them to report for examination. It was believed that the social worker would be better suited than the clinic secretary to make the necessary contacts, because of her awareness of the social and psychological problems involved and the subsequent possible resistance to the proposed study.

The upper extremity prosthesis of today is a "far cry" from the bulky, heavy appliance of 20 years ago. The many improvements made are too numerous to include in this report. Among them are many new types of terminal hook devices, with more precise control, designed for almost any need, and a much finer functional hand (APRL) covered with a flesh-like, matching cosmetic glove. Laminated plastic has largely replaced steel-reinforced leather sockets; double-walled sockets are used for better fits without disturbing cosmetic contours; and split sockets and mechanical aids facilitate elbow function for short below-elbow amputations. Improved methods of harnessing, using the newer plastic materials (Dacron, Vinyon), more accurate placement of swivels and cable retainers, and dual controls for activation

of the terminal device and elbow lock, have added immensely to prosthetic function. Quick-change wrist units to allow easy interchange of hook and hand devices, spring-assist elbow components to aid forearm lift, and positive locking elbow units have all contributed to smoother operating appliances. Even the shoulder disarticulation stump can now be satisfactorily fitted with a plastic shoulder cap and improved harnessing and control cables.

It was our belief, later confirmed in several instances, that some of our veterans who had been initially fitted with prostheses immediately during or after World War II, and who had soon been disappointed with their appliances and consequently had decided they could not successfully use an artificial limb with their particular amputation stump, were not aware of these many improvements which might transform their useless appendage to a functioning extremity. A detailed review of each above-elbow amputee who could be contacted was therefore believed warranted.

Results.—A search of the prosthetic clinic records revealed 39 cases of above-elbow or shoulder disarticulation amputations. An attempt was made to communicate with all of the patients, but 14 were lost to the study because of death, change of residence to another locality, or severe psychiatric problems requiring current psychotherapy. Detailed examinations were made of the remaining 25 patients who returned to the clinic in response to the social service worker's request.

Total Number of Cases Reviewed			39
1. Lost to follow-up			14
A. Dead		2	
B. Moved from city or overseas		10	
C. Under treatment for severe psychiatric problems		2	
2. Returned to clinic final tabulation			25
A. Using prostheses		21	
1. Full time	12		
2. Part time	9		
B. Not using prostheses		4	

In the initial survey it was found that 18 veterans were using their prostheses to some extent—11 full time and 7 part time, but 7 had completely discarded their initial prostheses within one year and had not used any type of appliance thereafter. As a result of the clinic's efforts, 3 previous nonusers were converted to users, 1 full time and 2 part time.

It was learned that, of the 21 amputees using a prosthesis, 19 were using some type of terminal hook almost exclusively, whereas the other two regularly used an APRL hand. The latter two preferred a hand because their work—one was a building guard, one an accountant—required the cosmetic more than the functional factor. Of the terminal hooks the APRL type was most commonly used, but one amputee preferred a Northrop 2-load hook and several used the Dorrance 5XA hook.

The original group of 7 non-users and 7 part-time users was of special interest in the study, as it was hoped that they might point the way to prosthetic areas needing greater improvement and more detailed attention. In the initial interviews these individuals made such statements as: "It gets in my way," "The prosthesis is too heavy and is of no help," "The discomfort outweighs the benefits," "Why waste the taxpayers' money," etc. as reasons for refusing a trial with one of the newer prostheses. It was immediately apparent that each individual problem would be difficult, and that much discussion, persuasion and positive demonstration would be required to change their negative attitudes.

All of the 7 non-users were World War II veterans, initially fitted in military

service prior to 1945 with appliances that had not been materially improved since the period following World War I. The service limb had proved unsatisfactory and had soon been rejected, and through the years the patient had learned to adjust to his daily activities without an artificial appliance. At the initial interview, none except Mr. C. expressed any desire to put forth the necessary energy for a trial with a new prosthesis.

Most of the part-time users restricted their use to some type of hook, either APRL, Dorrance or Northrop 2-load, for avocational activities, such as hobbies, household chores, or recreation activities. Two, however, confined themselves to the use of an APRL hand for better cosmesis while working or engaged in social activities. Some type of hook was also preferred by most of those using a prosthesis full time, although a few did occasionally switch to the APRL hand for social contacts.

Handedness.—Attention was also given to the question of whether the loss of the right arm in a right-handed person (vice versa with a left-handed person), affected the required adjustment to a prosthetic replacement for the previously dominant extremity. The response indicated that handedness is relatively unimportant except during the immediate postamputation adjustment period. The intact normal arm soon gained versatility and was able to take over dominant functions, such as writing, etc., and the prosthetic device was utilized in its usual role as an assistant.

Length of Stump.—Another factor considered was whether the length of the stump influences the use of a prosthesis. There is no doubt that an amputee with a short above-elbow stump or a shoulder disarticulation has the maximum handicap to overcome in the use of a prosthesis, and it is known that this does adversely affect its acceptance and use. On the other hand, it also became apparent that the motivation and emotional adjustment of the patient plays a highly important role, as the difficulties associated with a short stump can be overcome by good orientation and an intense desire to use the prosthesis. With poor insight and motivation, however, the added handicap caused by the short stump sometimes apparently tips the balance against regular use of a prosthesis.

Possible correlation of the length of an arm stump with frequency of use of a prosthesis was therefore investigated among the above-elbow group currently employing a prosthesis. We wished to learn whether the common complaint of those amputees who have difficulty in using a prosthesis, "The other fellow has a longer stump," did, in fact, have some basis.

The results of this phase of the study were interesting and revealing. Among the 9 part-time users the stump, measured from the outer tip of the acromion process to the fleshy end, ranged from 6 to 9 inches long, averaging 7½ inches. There was a much greater range of stump length among the 12 amputees who used a prosthesis regularly, varying from a minimal 2 inches to a maximal of 9. Four of the 12 full-time users had undergone amputations in the upper third of the arm, with stumps measuring 2, 3¼, 4 and 4½ inches respectively.

From this limited survey it appears that the length of the amputation stump is not the decisive factor in determining the ultimate use of a correctly fitted artificial limb, as one-third of the full-time users had shorter stumps than had any of the part-time users. This suggests that other conditions, peculiar to each individual case, are more significant than differences in the length of the stump. Throughout the study the examiners were repeatedly impressed with the importance of a positive, cooperative mental outlook

and a strong desire for a prosthetic aid. In many instances this appeared to be a significant factor, capable of overcoming such severe physical handicaps as deep scars, partial limitation of shoulder motion, muscle loss, retracted skin over the bone stump, etc.

Non-User Group.—The non-user group of 7 patients was subjected to intense study in an effort to learn of any basic reason why these particular amputees could not be better rehabilitated. One of the 7 was severely alcoholic and chronically unemployed, with very poor orientation, and it became apparent that further efforts in his case would be futile. Another had a shoulder disarticulation, with severe scars over the apex of the shoulder. He had had a very unsatisfactory experience with his initial prosthesis fifteen years earlier and had since become well adjusted in his occupation as a supervising contractor, without an appliance. He was not interested in taking the time to be fitted and trained with a new type of prosthesis, and expressed the opinion that it would be a waste of time and money. Two amputees were confirmed psychiatric patients under regular psychotherapy; their mental problems were too great an obstacle to permit prosthetic rehabilitation.

Three veterans originally classified in the non-user group responded to the clinic's interest in them by agreeing to try a new limb. None of the 3 had worn an artificial limb for many years, but they were finally persuaded to make one more effort. This was the result of detailed discussion of their problem with the entire Clinic team, a demonstration and exhibit of the newer appliances and carefully planned meetings with other amputees who were wearing similar limbs. Each of them then agreed to be fitted with a new prosthesis, undergo the necessary training and report back regularly for appraisal of their progress.

Mr. A., a government economist, had not worn an artificial arm for twelve years and was quite skeptical about trying to use one after so long a time. After being fitted, however, with a modern laminated plastic prosthesis appropriate to his amputation, with a terminal hook device, he decided that he was interested not only in the arm but in receiving some training in its use. He reported for three training sessions with the physical therapist and then began using the prosthesis at home for various household and garden chores, and especially for work in his hobbies. He did not feel compelled to use the prosthesis in his job as an economist, however, and after five months continued to use it only at home. He stated, "I am glad to have it and find it most useful in working at my hobby—building railroad models." At work he had learned to get along without a prosthesis and still preferred to "leave well enough alone." Apparently adjusting to a new limb in public is a more difficult task than in working at an avocation at home.

Mr. B., a Veterans' Service officer with a national veterans' organization, had worn a prosthesis for approximately one year after discharge from the service and then had discarded it. He had not applied for a replacement. The stump was moderately short (mid-arm level) but suited for a prosthesis. Despite his daily contacts with veterans utilizing similar devices, however, he had steadfastly refused to apply for another limb. He was finally coaxed to return to the clinic by a former fellow service officer who had recently joined our clinic team as administrator. At the initial interview the veteran was deeply concerned about the bulkiness of an artificial limb and its weight, and anticipated difficulty in manipulating the terminal device and the elbow lock. It was immediately apparent that the conventional type of prosthesis would not be acceptable to this particular veteran, and that a mod-

ified approach would have to be made to persuade him to at least part-time use of a prosthesis. Accordingly, the clinic team prescribed an unorthodox prosthesis, 4 inches shorter than the opposite normal arm, with a simple Dorrance hook terminal device, a screw-in wrist unit of minimum weight and a spring-assisted elbow unit. These devices not only diminished the weight of the prosthesis but facilitated elbow locking and functional motion of the terminal device. In addition, the forearm of the prosthesis could be brought closer to the body to increase its leverage, as a result of overall shortening of the entire prosthesis. With his handicap thus reduced, the veteran was stimulated to use a prosthesis again. He was immediately encouraged by the marked reduction in operational difficulties as compared to his experience with his conventional first prosthesis. His initial success led to further efforts and even to attendance at several training sessions with the physical therapist. After six months he was using the shortened prosthesis regularly at home and for fishing; he was greatly pleased with the limb and grateful for the clinic's help.

Cosmesis was sacrificed in this case in order to insure part-time use. It was realized that such a prosthesis could not be adapted for general use, because of the obvious problems with clothing and appearance associated with its short length. Nevertheless, this was listed as a successful effort that demonstrated the necessity for occasional unorthodox modifications, and particularly the need for individual prescription of every prosthesis to suit the needs and psychic adjustment of each amputee.

Mr. C., a chemical engineer, whose right arm had been amputated in the upper third, had not worn a prosthesis for fifteen years. After preliminary discussion and introduction to the newer prosthetic arm components, he was easily fitted with a laminated plastic limb with a simple Dorrance hook terminal device. He left the city to take an important position in a large industrial "plant" two months after receiving the prosthesis, during which time he had participated in two training sessions with the physical therapist. Soon thereafter he wrote to the clinic as follows: "I thought you might like to know how I feel about the arm that was delivered to me about two months ago. As you may recall from my first appearance at the clinic, I had originally been uncertain about the usefulness of the arm because of the very short stump and unsatisfactory past experience. I am delighted to say that the arm turned out to be very well fitting and quite comfortable. Because of this I am able to wear it daily from the time I get up until I get to bed. The arm is stable and controllable and I can constantly use it to advantage in most things I do in the office, at home, and elsewhere. . . . In closing I wish to thank you for calling me in to suggest I try an arm again. I shall be glad to reply if more details on the utility of the arm or any other remarks would be helpful to you." On the basis of his experience as an industrial chemist, he also recommended coating the individual strands of the metal cables with Teflon to reduce friction and distribute the load more evenly thereby increasing the strength of the pull on the terminal device and the elbow lock.

The rehabilitation of these 3 patients was in itself a significant reward and adequate reason for conduct of this study. The full use of a prosthesis by 1 amputee and partial use by 2 others demonstrates what can be accomplished with a difficult group of amputees by a careful evaluation, both physical and psychologic, of each amputee's problem followed by precise prescription for individual needs.

The contents of the letter from Mr. C., in addition to the remarks made earlier by the nonusers, demonstrate the importance of the psychic factors in adjusting to this, or any other severe disability. Once the initial shock of the injury or illness has subsided, the patient adjusts according to the pattern of his personality. If he has the emotional stamina to "roll with the punches," he soon learns to adjust to his disability and to use whatever known help exists. If he is the type who has always looked to others to do things for him, he may then "use" his disability (rationalization) as his reason for not being able to get a good job, being hard to live with, etc. He blames the initial, less manageable prosthesis for his failure to wear a later model, rather than being willing to take advantage of, and work with, the improved appliances now available to him. Although the loss of any joint, particularly the elbow, makes the prosthesis harder to manage, why is it that some have been able to do it while others have not? Apparently, the mental outlook and orientation of the patient are often the deciding factors.

SUMMARY

A field study of above-elbow amputees was conducted to determine the extent of current use of previously issued prostheses. A medical social worker was selected to make the field contacts in order to arrive at a better understanding of the problems peculiar to this group of patients.

Of 25 amputees who reported to the clinic, 18 were still using their appliances, 11 full time and 7 part time. Seven had completely discarded them within a year after their initial fitting and discharge from the military service. Four of the 7 could not be rehabilitated by our efforts. One of these was chronically alcoholic; 2 had severe psychiatric disorders under treatment, and the fourth was a poorly motivated but successful contractor who felt no need of an appliance for his shoulder disarticulation stump.

Three of the non-users were persuaded to try a new, more modern appliance. One of the 3, a particularly intelligent chemical engineer, has been using his new appliance regularly and constantly; the other 2 are now using theirs part time, for home and recreational activities. A radical modification had to be made for one of the part-time users by grossly shortening his artificial appliance to facilitate its use.

The final survey revealed that 12 of the 25 amputees were using a prosthesis full time for both work and hobbies. Nine confined its use to part time functions, 2 to work and 7 to home or recreational activities; 4 had completely discarded their appliances.

CONCLUSIONS

1. The above-elbow amputee is a particularly difficult individual to fit successfully with a prosthesis because of the added handicap imposed by loss of the elbow joint and the complex function required of an appliance for the upper extremity as contrasted to the relatively simple functions of an artificial leg. The prolonged expenditure of effort and intense training necessary for successful use requires a fixed and positive determination to overcome disability.

2. Progress made through recent research in prosthetics for the upper extremity has had a favorable influence on the acceptance of prosthesis by above-elbow type of amputees.

3. The study here described succeeded in demonstrating to patients the improvements in prosthetic components that have resulted from accelerated research in the past decade. With this information available to them, the number of those who were willing to accept and use a suitable modern appliance was increased.

4. All amputees should undergo periodic check-up examinations. Their prostheses should also be examined, so that improved components or modifications can be added as required, and the prosthetist can maintain the limb in the best possible working condition. With good maintenance, there are fewer operational difficulties and, consequently, a further diminution of the patient's resistance to the regular use of a prosthesis.

5. Each amputee represents an individual problem, requiring careful physical and psychic study. The prosthesis prescribed must meet his individual needs, with whatever modifications are indicated by appraisal of the overall problem; otherwise the appliance may be completely rejected. Partial use, although less desirable than full use, is preferable to nonuse and must sometimes be accepted as a limited objective.

6. A negative correlation was found between the length of the amputation stump and the partial or full use of a prosthesis. One-third of those who used an appliance full time had shorter stumps than had any of the part-time users.

7. Positive psychic adjustment, orientation, insight and motivation were observed to be highly significant in determining the rejection of an artificial arm or its acceptance and use.

8. The study confirms the general impression of the clinic team that recent improvements in arm prostheses have increased the number of above-elbow amputees, veteran and nonveteran, who are regularly using artificial appliances with comfort and satisfactory function.

SCHLUSSFOLGERUNGEN

1. Der hier beschriebene Patient, an dem eine Ellbogenamputation vorgenommen worden war, bietet besondere Schwierigkeiten für die erfolgreiche Anlage einer Prothese, weil zu der Behinderung durch den Verlust des Ellbogengelenks noch das Problem hinzukommt, dass von einer Prothese der oberen Gliedmasse eine kompliziertere Funktion erwartet wird als von dem verhältnismässig einfacheren Mechanismus eines künstlichen Beines. Der lange dauernde Aufwand an Kraft und energischem Training, der erforderlich ist, um den Arm mit Erfolg zu benützen, verlangt einen festen und entschiedenen Entschluss, die Untauglichkeit zu überwinden.

2. Die durch neue Forschungen auf dem Gebiet der Prothesen für die obere Extremität erzielten Fortschritte haben einen günstigen Einfluss auf derartige Amputierte ausgeübt, solche Prothesen anzulegen.

3. Mit Hilfe der hier beschriebenen Untersuchungen gelang es, den Patienten die Verbesserungen der Konstruktion der Prothese als Resultat der beschleunigten Forschung der letzten zehn Jahre zu demonstrieren. Dies hat dazu geführt, die Zahl der Patienten, die gewillt waren, eine moderne Apparatur anzunehmen und zu benützen, zu erhöhen.

4. Alle Amputierten dieser Art sollten periodisch nachuntersucht werden. Auch ihre Prothesen sollten nachgeprüft werden, sodass verbesserte oder abgeänderte Teile des Apparates nach Bedarf hinzugefügt werden und die Prothesenmacher das Glied in bestmöglichem Funktionszustand erhalten können. Bei guter Instandhaltung gibt es weniger Operationsschwierigkeiten, und infolgedessen setzen die Patienten dem regelmässigen Gebrauch der Prothese weniger Widerstand entgegen.

5. Jeder Amputierte hat seine eigenen Probleme und bedarf sorgfältiger Überwachung seines körperlichen und seelischen Zustandes. Die verordnete Prothese muss seinen persönlichen Bedürfnissen Rechnung tragen und allen Modifizierungen unterzogen werden, die die Auswertung der Gesamtsituation des Amputierten

erforderlich erscheinen lässt. Geschieht dies nicht, muss man auf eine völlige Ablehnung der Prothese gefasst sein. Teilweise Benützung der Prothese ist zwar weniger wünschenswert als ihre volle Anwendung, ist aber besser als ihre Ablehnung und muss manchmal als Teillösung akzeptiert werden.

6. Zwischen der Länge des Amputationsstumpfes und dem Masse der Prothesenanwendung stellte sich eine negative Beziehung heraus. Ein Drittel der Amputierten, die eine Prothese dauernd benützten, hatte kürzere Amputationsstümpfe als alle Amputierten, die die Prothese nur zeitweise benützten.

7. Eine positive psychologische Umstellung, das Sichzurechtfinden und Einsicht stellten sich als wesentlich heraus in der Entscheidung für Ablehnung oder Annahme und Benützung eines künstlichen Armes.

8. Die vorliegende Untersuchung bestätigt den allgemeinen Eindruck der klinischen Untersuchungsgruppe, dass neuere Verbesserungen von Armprothesen zu einem Anwachsen der Zahl von Amputierten mit Verlust des Ellbogens, Kriegsverletzte oder Nichtkriegsverletzte, geführt haben, die den künstlichen Arm regelmässig ohne Schwierigkeiten und mit befriedigender Funktion benützen.

CONCLUSIONS

1. Il est particulièrement difficile d'adapter une prothèse satisfaisante dans les cas d'amputation au-dessus du coude, à cause de la complication supplémentaire que représente la perte de l'articulation du coude, et de la fonction complexe exigée d'un appareil pour l'extrémité supérieure par comparaison avec celle relativement simple d'une jamble artificielle. Les efforts incessants et prolongés et l'entraînement intense nécessaires en vue du succès, exigent une volonté ferme et résolue à surmonter cette infirmité.

2. Les récents progrès accomplis en matière de prothèses pour l'extrémité supérieure, ont une influence favorable sur l'acceptation de prothèses par cette catégorie particulière d'amputés.

3. Grâce à l'étude entreprise et ici décrite, il a été possible de démontrer aux malades les améliorations du matériel de prothèse grâce au développement des recherches des dix dernières années. Du fait des informations mises ainsi à leur disposition, le nombre de ceux acceptant le port et l'utilisation d'un appareil moderne ne cesse d'augmenter.

4. Tous les amputés de cette catégorie devraient être soumis à des examens périodiques de contrôle. Leur prothèse devrait aussi être examinée régulièrement pour y apporter les modifications ou améliorations requises et afin de maintenir le membre dans un état d'activité aussi voisin de la normale que possible. Grâce à un bon entretien les difficultés sont diminuées et le patient a moins de raisons de s'opposer au port régulier d'une prothèse.

5. Chaque amputé présente un problème individuel, exigeant des examens physiques et psychologiques avertis. La prothèse prescrite doit être adaptée à ses besoins individuels, avec toutes les modifications requises par l'appréciation du problème dans son ensemble, sinon il risque de la refuser. L'utilisation partielle, bien que moins souhaitable que l'utilisation permanente, est préférable à la nonutilisation, et doit parfois être acceptée en tant qu'objectif limité.

6. Aucun rapport n'a pu être établi entre la longueur du moignon d'amputation et le port permanent ou total de la prothèse. Un tiers des cas portant l'appareil de façon permanente ont un moignon plus court que tous ceux portant leur appareil une partie du temps seulement.

7. Il a été constaté qu'une éducation

psychologique positive et perspicace (orientation, motivation, etc.) jouve un grand rôle dans la détermination du refus ou de l'acceptation du port d'un bras artificiel.

8. Cette étude confirme l'impression générale de l'équipe clinique, que les progrès récents accomplis en matière de prothèses du bras, ont augmenté le nombre des amputés (vétérans ou autres) utilisant régulièrement leur prothèse avec une sensation de confort et une fonction satisfaisante.

CONCLUSIONI

1. Gli amputati al di sopra del gomito rappresentano una categoria particolarmente difficile da riabilitare mediante protesi a causa, appunto, della mancanza dell'articolazione del gomito; un apparecchio per l'arto superiore, infatti, richiede funzioni estremamente complesse in paragone di una gamba artificiale. Per ridurre l'invalidità si richiedono sforzi prolungati, un intenso allenamento e una grande decisione.

2. I progressi raggiunti attualmente dalle protesi per l'arto superiore hanno avuto un'influenza favorevole sulle disposizioni d'animo di questi amputati nei confronti delle protesi.

3. Il presente lavoro ha lo scopo di dimostrare ai malati i progressi conseguiti nel campo delle protesi in conseguenza delle ricerche di questi ultimi 10 anni. Queste informazioni hanno accresciuto il numero di pazienti disposti ad accettare e ad usare volentieri le moderne protesi.

4. Tutti gli amputati di questo tipo debbono essere sottoposti a periodici controlli; anche le loro protesi debbono essere esaminate con cura, così da poter modificare o aggiungere le eventuali novità e permettere allo specialista di mantenere l'arto nelle migliori condizioni di lavoro. Una perfetta manutenzione assicura un uso regolare della protesi.

5. Ogni amputato presenta un problema particolare e richiede uno studio fisico e psichico accurato. La protesi deve soddisfare le sue particolari necessità ed essere fornita di quelle modifiche che gli consentano di superare i problemi personali, altrimenti deve essere cambiata. Un uso parziale è sempre preferibile a nulla e talvolta ci si deve accontentare di raggiungere un obiettivo limitato.

6. E'stato dimostrato che esiste un rapporto negativo fra la lunghezza del moncone di amputazione e l'impiego parziale o totale della protesi. Un terzo di coloro che usano l'apparecchio continuamente hanno monconi più corti di coloro che lo usano solo parzialmente.

7. La preparazione psichica, l'orientamento e la persuasione hanno molta importanza nel determinare il rifiuto o l'accettazione e l'uso di un arto artificiale.

8. Lo studio conferma l'impressione clinica che i recenti miglioramenti nelle protesi di braccio hanno aumentato il numero degli amputati, veterani o no, che usano regolarmente la protesi con utilità e soddisfazione.

CONCLUSIONES

1. El amputado por enciama del hombro es un sujeto poco apto para una prótesis tanto por la falta de la flexión del codo como por la compleja función requerida para el funcionamiento de un miembro superior, sobre todo en relación con las funcciones relativamente simples de una prótesis de miembro inferior. El prolongado exfuerzo y el entrenamiento tan intenso necesarios para lograr un uso eficaz requieren vencer grandes dificultades.

2. Los progresos en materia de prótesis en los íltimos tiempos han conducido a poder obtener prótesis muy aceptables para este tipo de amputados.

3. En este trabajo se logra demostrar a estos mutilados la mejoría en los componentes protésicos lograda con la inves-

tigación en la materia en los últimos diez años. Con esta información ha aumentado el número de los dispuestos a aceptar y usar estos aparatos modernos e idóneos para cada caso.

4. Todos los amputados de este tipo deben someterse a exploraciones periódicas. Sus prótesis también deben ser examinadas de forma que se les puedan añadir mejorías o modificaciones para que el protésico pueda mantener el miembro en la mejor condición de trabajo posible. Con una buena conservación hay menos dificultades de empléo y, consecuentemente, una disminución en la resistencia del paciente para el uso habitual de su prótesis.

5. Cada amputado constituye un problema individual que requiere un estudio cuidadoso físico y síquico. Las prótesis prescritas deben adaptarse a cada necesidad individual con las modificaciones necesarias para adaptarse al problema en su conjunto ya que de otra manera el aparato podría ser rechazado por el mutilado. El uso parcial, aunque menos de desear que el uso completo, es mejor que el no uso y muchas veces debe ser aceptado como un onjetivo limitado.

6. Existe una correlación negativa entre la longitud del munón y el uso total o parcial de la prótesis.

7. Se ha observado que la adaptación síquica positiva, la orientación y las motivaciones son muy significativas en la aceptación o rechazo del uso de un miembro artificial.

8. El estudio ha confirmado la impresión general del equipo clínico de que los adelantos recientes en las prótesis de brazo han aumentado el número de amputados por encima del codo que usan de un modo continuo estos aparatos arificiales con confort y función satisfactoria.

CONCLUSOES

1. O amputado acima do cotovelo é um individuo particularmente dificil de ser tratado com sucesso pela protese, devido a perda da articulação do cotovelo e a complexa função requerida por um aparelho para a extremidade superior, contrastada com as funções relativamente simples de uma perna artificial. O prolongado dispendio de esforço e um treinamento intenso necessarios para seu uso requerem uma determinação firme e positiva para vencer a incapacidade.

2. Progressos feitos através recentes pesquisas em proteses para a extremidade superior tiveram uma influência favorável na sua aceitação por este tipo especial de amputados.

3. Os estudos aqui descritos foram bem sucedidos na demonstração aos pacientes a melhoria nos componentes protéticos que resultaram de pesquisas aceleradas na ultima decáda. Com posse dessas informações, o numero daqueles que se tornamam desejósos de aceitar e usar um aparelho moderno adequado, aumentou.

4. Todos os amputados deste tipo devem se submeter a exames de "controle" periódicos. Sua protese deve tambem ser examinada, de tal maneira que melhores componentes ou modificações possam ser adicionados e o protético manter o membro nas melhores condiêões de função possiveis. Com bôa manutenção, haverá menos difficuldades operacionais e consequentemente, uma diminuição na resistência do paciente ao uso regular de uma protese.

5. Cada amputado representa um problema individual, exigindo cuidadosos estudos fisicos e psiquicos. A protese prescrita deve ir de encontro as necessidades individuais com as modificações indicados, encarando o problema total. Caso contrario, o aparelho pode ser completamente rejeitado. O uso parcial, embora menos desejavel que o integral, é preferivel ao não uso, devendosser aceito, como um objetivo limitado.

6. Encontrou-se uma correlação negativa entre o comprimento do côto de am-

putação e o uso parcial ou total da protese. Um terço dos que usaram o aparelho em tempo integral eram portadores de côtos mais curtos do que os de tempo parcial.

7. Ajustamento psiquico positivo, orientação, introversão e motivações foram observados como fatores altamente significativos na determinação da aceitação, rejeição e uso de um membro artificial.

8. O estudo confirma a impressão geral da equipe clinica de que progressos recentes nas proteses aumentou o numero de amputados supra-cotovelo, vetereanos ou não, que vêm usando regularmente aparelhos artificiais com conforto e função satisfatória.

A celebrated Dublin surgeon was once known to give a lesson of economy to a wealthy and fashionable young man remarkably fond of his handsome face and person. He was sent for, and found the patient seated by a table, resting his cheek upon his hand, whilst before him was displayed a five-pound note. After some little hesitation he removed his hand, and displayed a small mole on the cheek. "Do you observe this mark, doctor?"—"Yes, sir, I do."—"I wish to have it removed."—"Does it inconvenience you?"—"Not in the least."—"Then why wish for its extirpation?"—"I do not like the look of it."—"Sir," replied the surgeon, "I am not in the habit of being disturbed for such trifles; moreover, I think that that little excrescence had better remain untouched, since it gives you no uneasiness; and I make it a rule only to take from patients what is troublesome to them." So saying, he took the five-pound note, slipped it into his pocket, and walked out of the room, leaving the patient in a state of perfect astonishment.

It is related of a physician who received his daily fee from a rich old miser, who had it clenched in his fist when he arrived, and turned his head away when he opened his hand for the doctor to take it, that, on being informed his patient had died in the morning, not in the least disconcerted he walked up to the dead man's chamber, and found his clenched fist stretched out as usual; presuming that it still grasped the accustomed remuneration, with some difficulty he opened the fingers, took out the guinea, and departed.

Various professional persons have sometimes endeavoured to remunerate their medical attendants by reciprocal services: thus an opera-dancer offered to give lessons to a physician's daughters for their father's attendance upon him; and a dentist has been known to propose to take care of the jaws of a whole family to liquidate his wine bill.

—*Millingen* (circa 1837)

Characteristics of Colonic Carcinoma: Management of Complications

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ONE'S comment upon the surgical treatment of carcinoma of the colon must be related to his personal experience. After adequate contact with this major problem, all the complications and complex situations must have presented themselves several times. An analysis or review of each of these complications should contribute materially to the formulation of some positive conceptions relative to future management of similar situations.

The complications associated with malignant lesions of the colon are largely related to the segment of the colon involved. Lesions located in the right half of the colon produce symptoms and complications entirely different from those referable to the left half. This is due to the difference in the anatomic and physiologic differences between the two portions. The right half of the colon is derived from the midgut and is physiologically much like the lower part of the small bowel. Its content is semifluid, and it has the property of water absorption. Anatomically it differs in that the caliber of the bowel is larger and the musculature less pronounced than in the left half of the colon.

The colon is diminished gradually as it approaches the left side and increases in muscular thickness and texture, until it becomes a cylindric tube, with a muscular wall sufficiently powerful for the forceful expulsion of its dehydrated débris. The lymphatics permeate freely the muscular structure.

The malignant lesions encountered in the various segments of the colon, therefore, have physical characteristics peculiar to their anatomic and physiologic environment. Accordingly, lesions on the right

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The anatomic character of the colon as related to the development of carcinoma is described, with emphasis on the difference that exists between the right half and the left half of the colon. In the author's opinion, palliative colostomy is to be avoided. The merits of colostomy versus cecostomy for decompression of the acutely obstructed colon and the author's own cecostomy technic are outlined.

side grow well out into the lumen of the bowel, while those on the left side form, either by an infiltrating adenomatous growth, a constricted lumen, or lymphatic infiltration in the wall of the bowel, an annular or canalizing obstruction. The symptoms and complications are therefore different.

A palliative colostomy is indicated only for advanced malignant disease associated with impending obstruction. In many instances of such advanced malignancy colostomy can be avoided by anastomosing around the lesion and preserving the fecal current; or, for the brief period of life remaining, a diet without residue or liquid will obviate the annoying effects of a terminal colostomy.

Inflammation and Obstruction of the Right Half of the Colon.—Right colonic lesions are ulcerative growths that often break down, bleed and become secondarily infected. Pronounced anemia develops, and, owing to the absorption of the by-products of protein decomposition and the associated infection, the lemon color of cachexia is often seen. This is a characteristic of right colonic lesions; by no means does it indicate extension and inoperability, as it would were it associated with colonic carcinoma on the left.

Extrinsic inflammation and edema may result from this process of necrosis and secondary infection. Penetration and perforation may result in the formation of an abscess, often difficult to distinguish from an appendiceal abscess or diverticulitis.

These complications of right colonic carcinoma are rarely so pronounced that resection cannot be done as a primary procedure after adequate preparation. Blood loss can be restored by sufficient transfusions of whole blood, and infection can be diminished by thorough emptying of the alimentary tract from above by cleansing enemas and by penicillin, streptomycin and intestinal inhibitory sulfa drugs. The preliminary use of these is routine for all nonobstructive lesions of the colon whether on the right or the left side. In the presence of fever, an increased white blood cell count, evidence of local tenderness or a fixed mass, a more protracted and intensive period of preparation is demanded. The Miller-Abbott tube may be helpful in reducing distention of the small bowel, if present, and in putting the bowel at rest.

The true nature of the lesion, however, is not known until the abdomen is opened and the tumor mass examined. On the right side it may occasionally be observed that a preliminary sidetracking operation, in the nature of an ileocolostomy, is advisable.

Appreciable obstruction of the hepatic flexure may occur owing to edema, retraction and angulation, without extrinsic malignant extension, may respond to intestinal intubation and conservative medical measures and ultimately be primarily resectable.

Lesions of the Transverse Colon.—Lesions of the transverse colon are frequently diagnosed prior to obstruction. The mass is palpable under the anterior abdominal wall, and a careful barium roentgen study reveals a partially constricting lesion. I have seen such lesions adherent to the adjacent small bowel and have been able to resect the tumor *en masse* and to reconstruct the colon and small bowel, respectively, without unfavorable incident. Cecostomy serves well to decompress an obstruction of the transverse colon. The bowel can be thoroughly cleaned and the hepatic and splenic flexures adequately mobilized for wide resection and anastomosis without tension. The cecal opening serves as a splendid vent for the escape of gas and prevents intracolonic tension on the suture line.

Lesions of the Splenic Flexure.—Complications are often associated with carcinoma of the splenic flexure. The lesion is usually advanced and often fixed and

obstructed before the patient is seen by the surgeon.

The symptoms preceding obstruction are abdominal and vague. The lesion is high under the costal arch and often not palpable.

A barium enema is often misleading, since the proximal limb of the flexure may override or be anterior to the distal limb and show no deformity in the presence of a nonobstructive tumor. This results from a high fixed contracting lesion which has pulled the two limbs of the flexure into this relation. Only by an oblique exposure, therefore, can the splenic flexure be well visualized and the two superimposed segments distinguished.

Lesions of the Descending Colon and Sigmoid.—Lesions in this portion of the colon are usually annular or more or less constricting and, at the time of consultation, have caused varying degrees of chronic or complete obstruction. Fortunately, most apparent obstructions are not completely neoplastic but are partly due to associated edema, inflammatory reaction and invagination of mucous membrane into the narrowed neoplastic lumen. With proper surgical decompression and irrigation they relent sufficiently to enable the colon to empty itself partially through the distal segment.

Proximal surgical decompression can be done by cecostomy or transverse colostomy, the latter being preferred by most surgeons. In cases of complete obstruction with extensive distention of the proximal bowel this operation is not always easy. Often the distended right transverse colon is pushed high under the liver by the enormously distended cecum, which pushes everything well toward the midline and upward, so that the transverse colon is unapproachable.

The point of greatest clinical interest is that colonic obstruction is a closed loop obstruction and is subject to gangrene and perforation when the intracolonic pressure equals or exceeds the systolic blood pressure. In this way, obstruction of the colon is comparable to strangulated obstruction of the small bowel, as no colonic contents regurgitate back into the terminal ileum and distention progressively increases, with ultimate impairment of the blood supply. Surgical decompression, therefore, should not be long deferred, else gangrene and rupture of the cecum will occur. I have observed this twice, and in 1 instance it developed pending preparation for surgical intervention. Cecostomy, however, was immediately done, and fortunately there was little abdominal soiling. Recovery occurred, and subsequently the lesion was successfully resected.

I have also observed a spontaneous rupture of the sigmoid into the free abdominal cavity in a man aged 21. On lifting, a severe abdominal pain occurred, and the patient was sent to the hospital with the diagnosis of a perforation of a duodenal ulcer. The abdomen was boardlike. Operation revealed no ulcer perforation. The abdomen was contaminated, and a pendulous sigmoid easily revealed a perforation of an indurated lesion of the antimesenteric side of the bowel. This was exteriorized through a left pararectus incision and resected. A complementary cecostomy was done to prevent intestinal distention and to reduce the likelihood of peritonitis. A Miller-Abbott tube was passed. (It is to be noted that the peritoneum can withstand much contamination if intestinal distention is prevented.) The patient recovered. The intestinal opening was later closed, and at the time of writing the patient has been well for more than fifteen years.

Lesion of the Rectosigmoid.—Anatomic differentiation of the rectum, the rectosigmoid and the extreme lower portion of the sigmoid is not very clear. The rectosigmoid can not be anatomically defined.

The excised specimen shows no such anatomic structure. It is considered appropriate to describe carcinoma of the portion below the pelvic peritoneum as "extraperitoneal" and carcinoma of the areas above and below the promontory of the sacrum as "intraperitoneal."

Lesions of these areas are constricting and frequently obstructive, requiring surgical decompression as a preliminary procedure. Subsequently an anterior type of resection can be done if local conditions are favorable. If the lesion is large or fixed, or if metastatic glands are observed, abdominoperineal resection offers the best chance of removing the involved tissue.

Lesions below the pelvic peritoneum, in my opinion, are often unsuitable for excision and intestinal reconstruction. The problem always is, can *all* of the carcinoma be removed and the two ends of the bowel sewn together successfully? This has been emphasized by Gilchrist and David. In the presence of large tumors with lymph nodes, distal metastasis may be present and undetected. The most radical procedure is advisable and can be anatomically accomplished only by abdominoperineal resection.

In the series here described there were 107 lesions of the lower sigmoid, rectosigmoid and rectum, for which anterior resection, with or without complementary colostomy or abdominoperineal resection, was done; in three-fourths of the cases the latter method was employed.

The mortality rate for the entire series of colonic and rectal carcinomas was 7.09 per cent. These low reconstructions are performed largely as an effort to avoid an abdominal colostomy. The surgical compromise with complete anatomic excision of all the gland-bearing tissue is made at the expense of maintaining a normal fecal current. Why compromise, for sentimental and esthetic reasons, one's surgical principles in the treatment of carcinoma of the rectum? A frank discussion should convince any intelligent person of the advantage of a radical procedure.

An abdominal colostomy properly made, with removal of the primary lesion, can be effectively controlled and will cause a minimum of trouble. The popular conception is based upon inadequate information, sentiment and mental abhorrence. Patients who have accepted colostomies properly performed for removable lesions and who have learned to care for them properly have little or no trouble. The bowel in time adapts itself to its new environment and functions with a minimum of inconvenience.

Palliative Colostomy.—Palliative colostomy is usually a procedure to be condemned. It gives no palliation; it adds little to the patient's life but contributes much to his discomfort. It is uncontrollable and has contributed much to the discredit of colostomy performed for removable lesions. The pain and discomfort accompanying an unremoved malignant lesion are attributed to the colostomy rather than to progress of the disease.

Colostomies made for palliation of unremovable lesions cause the greatest distress. They are to be condemned. One never hears of such a colostomy that functions well. The uncontrollable nature of these palliative colostomies, as well as the pain they cause, is largely due to the progress of the unremoved carcinoma.

Fixation of Extension.—Fixation is often associated with colonic carcinoma, and removal may jeopardize surrounding anatomic structures if caution and care are not exercised in finding a line of cleavage. These structures may be isolated above or below the fixed lesion, followed to the point of involvement and separated with greater certainty of protection.

I have found this useful in isolating an adherent ureter or in freeing lesions of the iliac colon from the great vessels.

I have extended the use of excision for colonic and rectal carcinoma to include many cases in which, because of fixation and adjacent involvement, I formerly considered its lesions inoperable and did only a colostomy.

Lesions involving an adjacent loop of small bowel are removed *en masse*, and tubes, ovaries and uterus may be excised along with the carcinoma if adherent and involved. Rectal lesions involving the posterior wall of the bladder have been extirpated together with a segment of the bladder. Parts of the anterior abdominal wall have been removed, as have the surrounding parietal peritoneum and the underlying muscle, for lesions of the lateral aspect of the colon.

In 2 instances the left lobe of the liver was removed because of a large isolated metastatic lesion occurring in the abdominal phase of a low left colonic tumor. These extensive procedures are often palliative but have resulted in an extended and more comfortable life. They have often obviated the necessity of a palliative colostomy.

Surgical Principles.—Obstruction of the colon presents a complication that prohibits a primary attack on the lesion. This is in contrast to obstruction of the small bowel. With the former, the problem is to decompress the colon and prepare it for subsequent resection of the lesion, while with obstruction of the small bowel surgical intervention is directed primarily at removal of the lesion. It is not only in the presence of acute obstruction of the colon that decompression is desired; in all cases of chronic obstruction of the left side of the colon, preliminary decompression of the proximal portion of the bowel is indicated. Only on a clean, unobstructed colon can primary resection and anastomosis be done safely.

Obstructive lesions of the right side of the colon may be decompressed by means of cecostomy, with or without ileo colostomy. Ileocolostomy is desirable and sufficient when the lesion is fixed and inflammatory and the ileocecal valve is incompetent. Lesions of the left side of the colon usually are annular and constricting. At the time of consultation one frequently observes varying degrees of obstruction and, in a few cases, complete obstruction.

Fortunately, most obstructions are not actually complete, being partly due to edema, inflammatory reaction and invaginated mucous membrane. With proper surgical decompression and by means of irrigations, the obstruction will relent sufficiently to permit the colon to empty itself partially through the distal segment. This materially aids thorough cleansing of the colon.

Cecostomy as the preferred means of decompression of the acutely obstructed colon is controversial. As usually done, with a catheter held with a purse string in the cecum and the cecal wall sutured to the parietal peritoneum, a cecostomy functions only as a vent for the escape of gas. Irrigation and preparation of the bowel cannot be done through a small opening in the cecum fixed to the parietal peritoneum and connected to the outside by a fistulous tract. It is not a cecostomy—it is a cecal fecal fistula. A similar technic used on the right half of the colon for the same reason would be equally ineffective and would be, in like manner, a colonic fistula. It would be of no service as an avenue for irrigation and cleansing of the bowel. A cecostomy that is comparable to a colostomy, with a large outside stoma, is adequate for thorough irrigation and is much easier, subsequently, to close. The cecum is large; the approach is easy, omental attachments are not present, and edema and induration will not be sufficient to obstruct the bowel intestinal lumen, as may occur in colostomy closure.

I perform a cecostomy as I do a colos-

tomy, with a large cone of cecum delivered to the outside; this provides an adequate external opening for drainage and irrigation. No suturing of the bowel to the peritoneum or the abdominal wall is done. The bowel readily adheres to these structures. In a few hours, edema of the protruding segment of cecum prevents its retraction into the abdomen. My cecostomy clamp* retains it outside until this edema is sufficient. The clamp is removed after forty-eight to seventy-two hours. This is truly a functional cecostomy; it has advantages comparable to those of colostomy and in many instances is superior.

I consider this type of cecostomy the best procedure for decompression of the acutely obstructed colon, for the following reasons:

1. In the presence of acute colonic obstruction the most distensible part of the colon is the cecum. It is the segment that in time may be perforated. This will occur when the intracecal pressure becomes greater than the systolic blood pressure. The blood then cannot be carried to the antimesenteric region of the cecum, and areas of necrosis will develop. Perforation will eventually occur.

2. A surface cecostomy with a good stomal opening permits decompression of the colon and releases intracolonic pressure at the site of the neoplastic obstruction. Edema and induration subside, and the bowel at the site of the neoplasm again becomes partly patent. With the release of this associated agent of obstruction, edema and induration, the bowel may be irrigated and thoroughly cleaned by enema and cecal irrigations. In no instance is it impossible to cleanse the bowel thoroughly and prepare it for satisfactory resection when the cecostomy has a good open stoma on the surface of the abdomen.

3. The distended cecum is the most accessible segment of the large bowel for surgical decompression. It is the most distensible portion of the obstructed colon. In no way does it interfere with the extensive resection often required for lesions of the left half of the colon.

4. The right half of the colon is hard to approach surgically and to decompress when distended. It delivers poorly, owing to omental and mesenteric attachments. A glass rod under the distended colon may, through pressure, erode into a vessel and produce bleeding, and a distended segment of the right half of the colon is difficult to deliver into the field of operation for such support and for tubal decompression. Decompression of the right half of the colon adds little solidity to the fecal discharge and contributes little to the thoroughness of subsequent colonic irrigations and cleansing of the lower part of the colon.

5. A right colostomy imparts no information as to the viability of the cecum, which may contain devitalized areas unknown to the surgeon at the time of right colostomy. If such areas are present they will be perforated, even though a successful right colostomy has been done. This I have observed on 3 occasions. Most undesirable is the fact that a right colostomy materially interferes with the extensive mobilization often necessary for radical resection of lesions of the left half. Left colectomy with contemplated anastomosis of the left transverse colon to the lower sigmoid or rectosigmoid is difficult or impossible to accomplish when a right colostomy is present. This extensive procedure is being advocated more and more widely, as it is frequently indicated for radical extirpation of gland-bearing tissue. In such circumstances it is usually necessary to mobilize the hepatic flexure for adequate anastomosis without tension. This cannot be done in the presence of a right colostomy. It can be done easily in the presence of a cecostomy. Why, then, handicap fu-

*Manufactured by V. Mueller & Company, Chicago.

ture surgical procedures by a colonic decompression that restricts resection, mobilization and secure anastomosis? Especially is this objectionable when decompression and adequate preparation of the colon for subsequent operations can be achieved by means of a well-performed surface cecostomy.

In my opinion, therefore, a cecostomy with an adequate stoma on the surface of the skin is preferable to colostomy for decompression of the acutely obstructed left colon with intrinsic malignant disease.

Recommended Procedure for Colonic Decompression.—Through an adequate incision, with pentothal or spinal anesthesia (not local anesthesia), I deflate the distended cecum or colon by needle puncture and grasp the deflated bowel at the point of needle puncture with a flat no-tooth thumb forceps. My special clamp is applied to an adequately suspended cone of bowel. The abdomen is then closed completely around this protruding segment of cecum or colon before it is opened to insert a catheter into the bowel through the round opening in the clamp. The catheter is fixed by suture to prevent its slipping out. It has been pictorially described in other publications (see bibliography). This procedure does not completely divert the fecal current. It is advocated only for acute obstruction of the colon due to malignant disease for which subsequent resection is contemplated.

This method exteriorizes only an adequate segment of the cecum or colon and provides a sufficient vent for the passage of gas to pass through the catheter. In either instance it makes a good stoma on the surface of the skin, for irrigation.

The inserted catheter acts largely as a vent for gas and prevents redistention of the bowel. The clamp is removed later, a good stoma being left, and the bowel is subsequently irrigated and cleansed. This method is simple, and practically aseptic and presents no difficulties. It should always be done with the patient under light anesthesia. Relaxation, and not anxiety and abdominal resistance, is highly essential for intestinal exposure and decompression. I have tried both.

SUMMARY

The anatomic characteristics of the colon are described as they are related to the development of carcinoma.

The nature of carcinoma in the various segments of the colon is explained, and the more frequent complications referable to the colonic segments are discussed.

Surgeons are urged to avoid, when possible, the performance of palliative colostomy, the disagreeable features of which are indicated.

In certain situations, abdominal colostomy is advised for removable lesions, rather than attempted restoration of the continuity of the bowel.

The merits of cecostomy versus colostomy, as a means of decompression of the acutely obstructed colon, are discussed.

A descriptive discussion of the formation of a surface cecostomy with an abdominal stoma is presented. The technical value of a cecal stoma versus a stoma in the transverse colon, in radical resection of the left half of the colon, is strongly emphasized.

ZUSAMMENFASSUNG

Die anatomischen Eigenheiten des Dickdarms werden in ihren Beziehungen zur Krebsentstehung beschrieben.

Die Form des Krebses in den verschiedenen Dickdarmabschnitten wird erklärt und die in den verschiedenen Segmenten häufiger auftretenden Komplikationen werden erörtert.

Die unangenehmen Eigenheiten der Ko-

lostomie werden angeführt, und die Chirurgen werden gemahnt, diesen Eingriff als Palliativmassnahme wenn möglich zu vermeiden. Unter gewissen Umständen empfiehlt sich allerdings die abdominale Kolostomie bei resezierbaren Geschwülsten eher als der Versuch, die Kontinuität des Darmes wiederherzustellen.

Die Vorzüge der Zökostomie gegenüber der Kolostomie zur Dekompression des akut verstopften Dickdarms werden erörtert.

Die Anlage einer oberflächlichen Zökostomie mit Ausmündung am Bauche wird anschaulich dargestellt. Besonders hervorgehoben werden die technischen Vorzüge der Zökumöffnung gegenüber der Kolostomie im Querdarm bei radikaler Resektion der linken Dickdarmhälfte.

RÉSUMÉ

Les caractéristiques anatomiques du colon sont décrites en relation avec l'évolution du carcinome.

La nature du carcinome telle qu'il se présente au niveau des différents segments du colon est expliquée et les complications les plus fréquentes sont discutées.

Les chirurgiens sont exhortés à éviter autant que possible la colostomie palliative dont les inconvénients sont énumérés. Dans certains cas il faut préférer la colostomie abdominale pour les lésions extirpables, à une tentative de restauration de la continuité intestinale.

Les avantages de la caecostomie par opposition à la colostomie, comme technique de décompression en cas d'obstruction aiguë du colon, sont discutés.

L'auteur présente une analyse descriptive de la formation d'une caecostomie de surface avec une bouche abdominale. Il fait spécialement ressortir la valeur technique d'une bouche caecale par rapport à un abouchement au colon transverse pour la résection radicale de la moitié gauche du colon.

RESUMEN

Se señalan las características anatómicas del colon y sus relaciones con la evolución de los tumores en este órgano, describiendo la anatomía patológica de los mismos según su localización y las complicaciones más frecuentes en cada parte del colon.

El cirujano debe evitar en lo posible la práctica de colostomías paliativas, cuyos desagradables inconvenientes se señalan también. En algunos casos, sin embargo, la colostomía está indicada después de extirpar el tumor, sin que pueda intentarse el reestablecimiento de la continuidad del colon.

Se señalan asimismo las ventajas de la cecostomía sobre la colostomía como operación descompresiva en una oclusión aguda del colon.

Se hace la descripción de una cecostomía de superficie con fístula abdominal, y se señalan las ventajas de ésta sobre la transversostomía en las hemicolectomías izquierdas.

SUMARIO

As caracteristicas anatomicas do cólon, são descritas em relação ao desenvolvimento do carcinoma. A natureza do carcinoma nos varios segmentos, é explicada e as complicações mais frequentes relacionadas aos segmentos cólicos e discutidas.

Os cirurgiões devem evitar, sempre que possível, fazer colostomias paliativas sendo apresentadas as consequencias desagrádaveis destas.

Em certas circunstancias, faz-se a colostomia abdominal, para lesões removíveis ao envés de se tentar a restauração da continuidade do intestino.

Discute os méritos da cecostomia versus

colostomia, como uma medida de descompressão do cólon agudamente obstruido.

Descreve e discute uma cecostomia de superficie com estoma abdominal. Chama a atenção para a importancia técnics de um estoma cecal versus um colon transverso, na ressecacão radical da metade esquerda do cólon.

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After the fall of Dunkirk, Europe ceased to be a combat zone, and for three years the school of war surgery, and the trial ground for new methods was transferred to Africa. Here, as in all warfare, the problems and their solutions were modified by local conditions, by the huge distances, the rapidity of movement and the fluidity of line inherent in modern mechanized warfare, the difficulty of supplies, and the relative sterility of the soil. Surgery was done by small units whose extreme mobility limited their supplies to bare necessities, and whose patients must usually be sent after operation on a long and rigorous journey through unknown hands to an unknown destination.

Surgical practice began where it had stood at the time of Dunkirk. The standard treatment was the excision of early and the drainage of late wounds, the covering of excised surfaces and the maintenance of drainage by vaseline gauze, and enclosure of the limb in an unpadded plaster case. Two accessory measures, the sulphonamides and resuscitation, were being explored for the first time on a large scale.

When the war in Europe shut down, the power of the sulphonamides to prevent infection had been proved in the laboratory but no firm conclusion of their value in war surgery had yet been reached. In the Middle East it soon became apparent that men who had been given sulphonamides, even in irregular quantities, arrived at the base in better condition than the rest. By the institution of a sulphonamide label and twice-daily dosage, it became possible to assure that every man ordered the drugs received them from the time of leaving the field ambulance to his arrival at the base. With this regime, the great majority of wounds, even those that had received no surgical treatment, arrived at the base clinically clean.

—*Ogilvie*

Editorial

A History of Hospitals*

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THE point of reference which most readily identifies a hospital in history is the fact that it is a collection of sick persons in one spot for the purpose of obtaining treatment. Hospitals have always existed in one form or another throughout the ages, but the ancient historians regarded them as a part of the background and the philosophy of the civilization that they described. They were established as the people needed them. References to them are fragmentary.

The Roman emperor Justinian recognized several kinds of hospitals designed to care for various unhappy and unfortunate persons. Byzantine historians identified the *nosocomium*, a retreat for the sick; the *xenodochium*, a retreat for strangers (public houses for pilgrims); the *brephotrophium*, an asylum for indigent children; the *phanotrophium*, a hospital for orphans; the *gerontocomium*, home for the aged, and the *morotrophium*, a hospital for idiots.

The word *hospitium* is used frequently, from the fifth century A.D. onward, to indicate a place for the reception of strangers and pilgrims; it was probably synonymous with the word *xenodochium*. The words "hospitium" and "nosocomium" do not seem to have meant the same thing. Although we assume that our word *hospital* was derived from hospitium, the European words *Krankenhaus* and *ziekenhuiz* are more descriptive of the function of a hospital.

The editorial pages of the Journal of the International College of Surgeons *will continue to be honored by presentations of rare and extraordinary historic value, the lectures presented at the International Surgeons' Hall of Fame on medical and surgical history from the earliest recorded achievements to those of our own times. We believe that* Journal *readers who were not able to attend the lectures will find them as exciting as did the audiences present at their delivery. The story of progress in the healing arts and the giants of medicine and surgery to whom we owe the amazing brilliance and scope of modern achievements is intrinsically thrilling and is a vital part of the education of every cultivated man and woman, inside or outside the profession. It is altogether fitting that it should appear in these pages, since the International College of Surgeons is first, last and always a teaching institution.*

*All illustrations appearing in this editorial are used by courtesy of Hospital Management, 103 West Adams Street, Chicago.

The most comprehensive work on the history of hospitals is that written by Burdett,[1] who reasoned logically that in those civilizations in which medical science was highly developed there must have been places where the sick could attend so that the physicians could take care of their needs. He said:

> "In the eleventh century B.C. there was a college of physicians in Egypt in receipt of public pay. According to Pliny, if the physicians were paid officers of the state they were required to treat the poor gratuitously.
>
> "These physicians were not, however, likely to attend the sick in their own homes or at their private consulting rooms, except in extreme cases; and so it is presumed that . . . there were official houses to which the poor went at certain times."

Burdett noted that a similar type of institution is described by Pindarus in Athens in the fifth century B.C. These hospitals, if indeed they were hospitals, are the earliest institutions of which we have any record, although the Sumerians are believed to have had hospitals in 4000 B.C.

Hindu Hospitals.—There are many who identify hospitals with the development of the Christian church, but history positively indicates that the Christians did not have a monopoly on compassion. Compassion for the sick in India was manifest in the third century B.C. under the reign of Asoka, who published an edict commanding the establishment of hospitals throughout his dominions. These were still in existence six hundred years later, when they were visited by a Chinese traveler, Fa-Hian, who wrote in 399 A.D.:

> "The nobles and landowners of this country have founded hospitals in the city, to which the poor of all countries, the destitute, the cripples, the diseased may repair for shelter. They received every kind of requisite help gratuitously. Physicians inspect their diseases, and according to their cases, order them food and drink decoctions or medicines, everything, in fact, that may contribute to their ease. When cured they depart at their own convenience."

The inspiration for such institutions came from the Buddhist religion, which holds that all life is sacred. Hospitals were established not only for people but for animals and insects. One such institution was still in existence in India at the beginning of the nineteenth century. It was devoted to the treatment of animals.

It is also logical to suppose that the great medical schools, which seem to have existed since the dawn of history, had collections of sick persons to demonstrate diseases. It is said that Hippocrates visited Hindustan, where he observed surgical operations and clinical cases which were maintained chiefly for the education of medical students—a feat that could scarcely have been accomplished unless the sick had been collected in one spot.

Burdett also believed that hospitals existed in Ireland as early as 300 B.C. and quoted ancient laws of that country, which sanctioned the providing for the sick of *"a physician, food, proper bed, furniture and proper houses."* Burdett concluded that hospitals *"are the outcome of the innate tenderness that marks all noble souls in whatever land they dwell and in whatever creed they are received."*

Early Greek and Roman.—Be that as it may, there seems to have been a remarkable dearth of compassion from the fifth century B.C. to the time of Christ and even afterward. An unidentified historian,[2] writing in 1817, stated that in ancient Greece there was no establishment that bore any resemblance to our hospitals and that the sick were abandoned to their fate unless they had a private fortune and could afford the services of a physician. The author intimated that this may be the reason why Hippocrates swears *"that he will all his life visit the sick and give them his advise gratuitously."* The same author

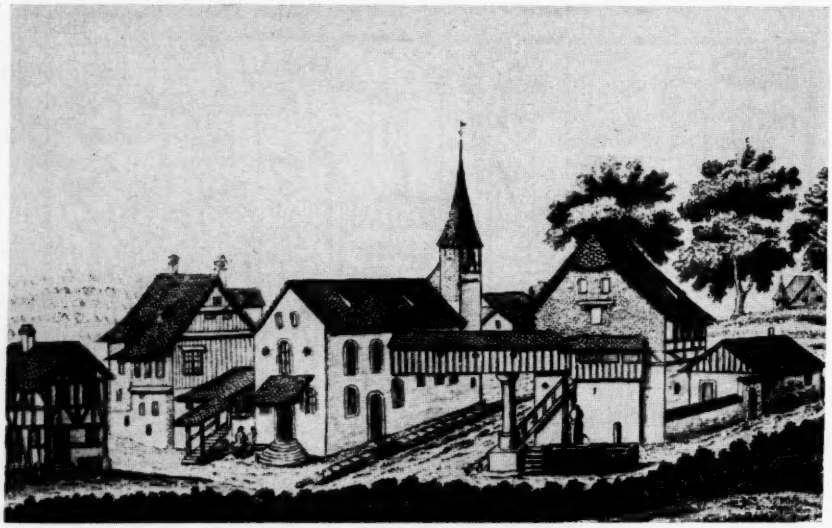
A Ward in Hotel Dieu of Paris. From a wood engraving of the 16th Century

pointed out, too, that among the Romans "*we should seek in vain for any establishments intended to alleviate the suffering of the indigent sick.*"

No establishments for the sick seem to have been erected either under the Roman republic or under the emperors. A possible explanation for this is that the society of these days was divided at all times into free men and slaves. Free men could afford private physicians, and slaves were expendable. Even so, the law of the Emperor Claudius provided that a sick slave abandoned by his master could come to the temple of Aesculapius in the island of the Tiber, and if he recovered he was declared to be free.

It is difficult to believe that the Romans were entirely devoid of compassion, for Cicero, the orator, once remarked that "*in no other act does man approach so near the Gods as when he is restoring the sick to the blessings of health.*" Although some historians regard the temples of Aesculapius as the earliest hospitals in the Greek and Roman civilizations, Beckmann[3] expressed the opinion that "*diseased people were carried to the temple of Aesculapius, but for a very different purpose. They waited there for a cure, as some Christian believers still do in a church which contains wonder-working images.*"

Early Christian Institutions.—Muratori[4] asserted that the oldest hospitals were not properly established for sick travelers, but rather for the healthy. (Here he probably refers to the *hospitium* or the *xenodochium.*) Christians were encouraged to make pilgrimages to holy places, and for several centuries, apparently, there were many pilgrims traveling from one place to another. They traveled without money, in the full confidence of meeting with gratuitous assistance from hospitable Christians. Many hospitals were established, particularly in remote and dangerous places. Well-to-do persons were expected to bequeath money to maintain



Hospital of St. Gall, St. Gall, Switzerland.

these places for those who came after, either because of services received or because of a vow to give tangible thanks for supernatural benefits.

Hospitals were erected in France, Italy, Palestine and even high in the Alps by the Scots, Irish, Saxons, Franks and Normans, presumably for use by those of their own people who were undertaking pilgrimages. They were managed by monastic orders and brotherhoods, and they prospered. But there is much doubt, however, that these were truly hospitals as we define them today.

Hospitals (nosocomia) appear to have been established by the Christian church as instruments for the propagation of the faith. There were some outstanding hospitals noted in Caesarea, in Cappadocia, in Constantinople and in Alexandria. These great hospitals all seem to have been founded after the Council of Nicaea in 325 A.D., at which the bishops of the church were instructed to establish a hospital in every cathedral city. A decree of Constantine in 335 A.D. ordered the closing of the temples of Aesculapius.

The first regular hospital of which we have any knowledge was built in 380 A.D. under the auspices of Fabiola, who is described by St. Jerome[5] as a Roman matron of distinguished piety. He called this a *nosocomium*, which is

> "a house in the country for the reception of those unhappy sick and infirm persons who were before scattered among the places of public resort—and for the purpose of furnishing them in a regular manner with nourishment and those medicines of which they might stand in need."

Leprosy.—The Crusades gave an impetus to the development of hospitals in an unexpected way, by bringing back the disease of leprosy. Up to that time leprosy had not existed in epidemic proportions in England and continental Europe. The continued encouragement of pilgrimages may have helped to spread the disease. At one time there were more than 200 hospitals occupied by lepers in England, when the total population was scarcely 3,000,000. These were called lazar-houses.

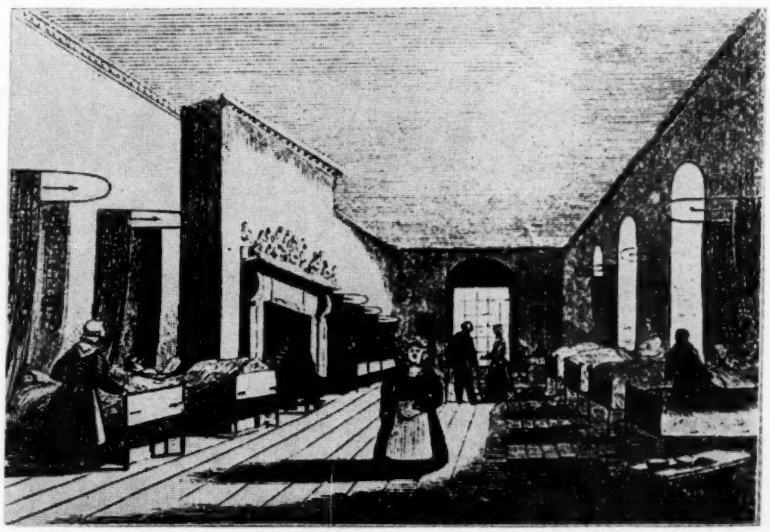
Although most of the people occupying these hospitals were assumed to have

leprosy, there is some doubt about the diagnosis. A "lazar" was any person having an inveterate, loathsome, disfiguring or malignant skin eruption. The word referred to Lazarus the beggar who was full of sores and so much beloved by Jesus. A lazar could be anyone suffering from scrofula, erysipelas, leprosy or tuberculosis. All these diseases were assumed to have been contracted by sinful activity. The compassionate Christian people provided food and shelter, as a work of mercy, for those who were presumably awaiting death from leprosy. Lazars were well cared for. Other sick persons took advantage of this to get food, clothing and lodging for themselves, despite the probability of contracting leprosy.

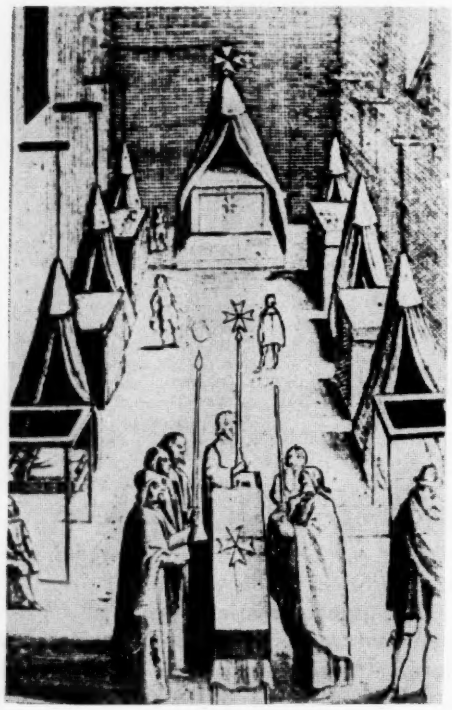
Christ and the lepers.

The contagious nature of leprosy was recognized early. Lepers were banned from the streets by legal action and often by violence. Many of them were burned alive in France in 1318 in order to purify the air. In east Prussia a law extant in 1230 said *"be a man laden with sick women, children, brothers, sisters or domestics, then let them be where they lie, and we praise him too if he would burn himself or the feeble person."*

The psychosomatic aspects of leprosy were not neglected. Hospital rules laid much stress upon the alleviation of the agonized mind by physician and priest. These were urged to try to stimulate hope



St. Bartholomew's Hospital, London, founded in 1123.



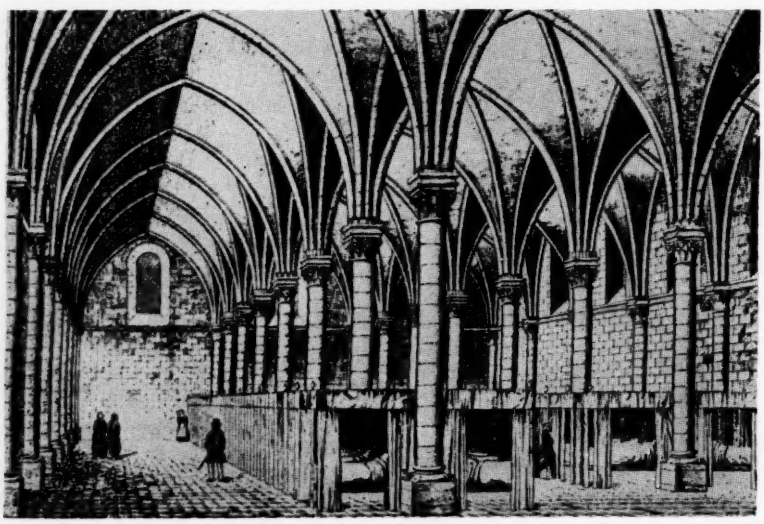
Great ward of Hospital of St. John of Valeta (seventeenth century).

of recovery in the despondent patient who had been compelled to leave home and society.

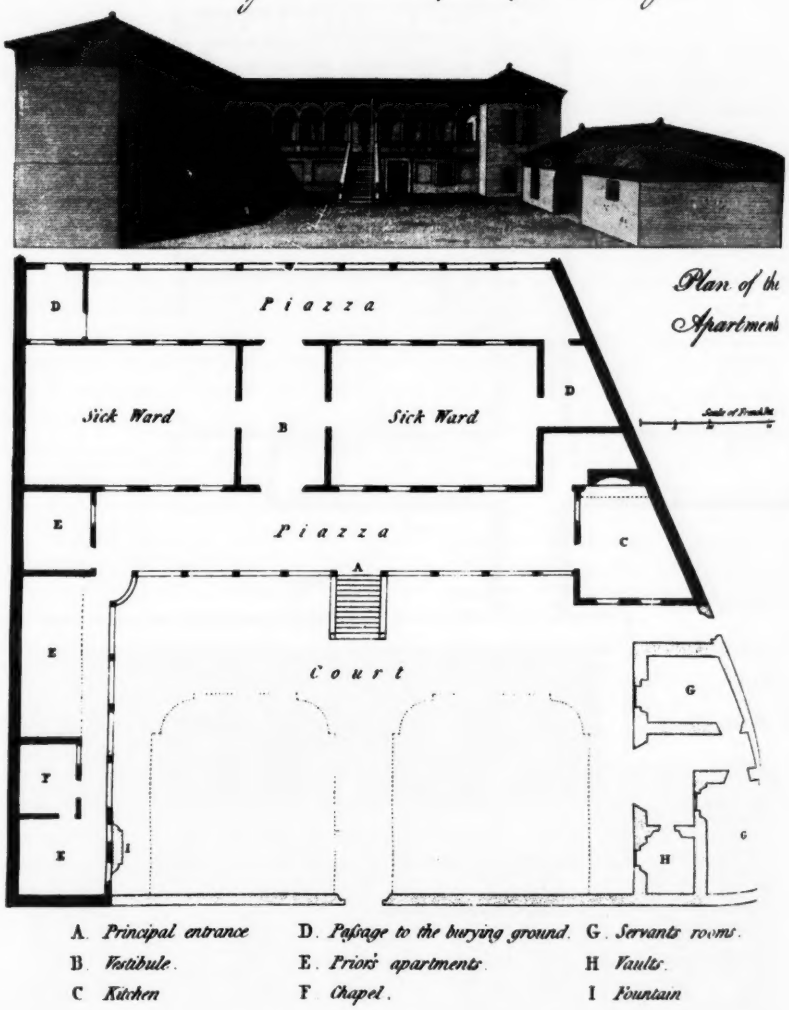
Medical treatment for leprosy was not effective. Almost as many hospitals offered miraculous cures as there were that gave definitive treatment. Thus, for example, the healing waters of the mineral springs were featured by the hospital at Bath, while the miraculous water containing the diluted blood of St. Thomas from the Crypt of the cathedral at Canterbury was offered by the hospital there.

Lazar houses were built throughout Europe in large numbers. At one time there were 19,000. They abounded until about the year 1350. At this time occurred another of the great incidents which have altered the development of hospitals throughout the years. The year 1349 marked the plague of the black death, which carried off large numbers of lepers as well as healthy persons. The plague literally emptied the lazar houses of their patients.

By 1400 leprosy was rare but had not

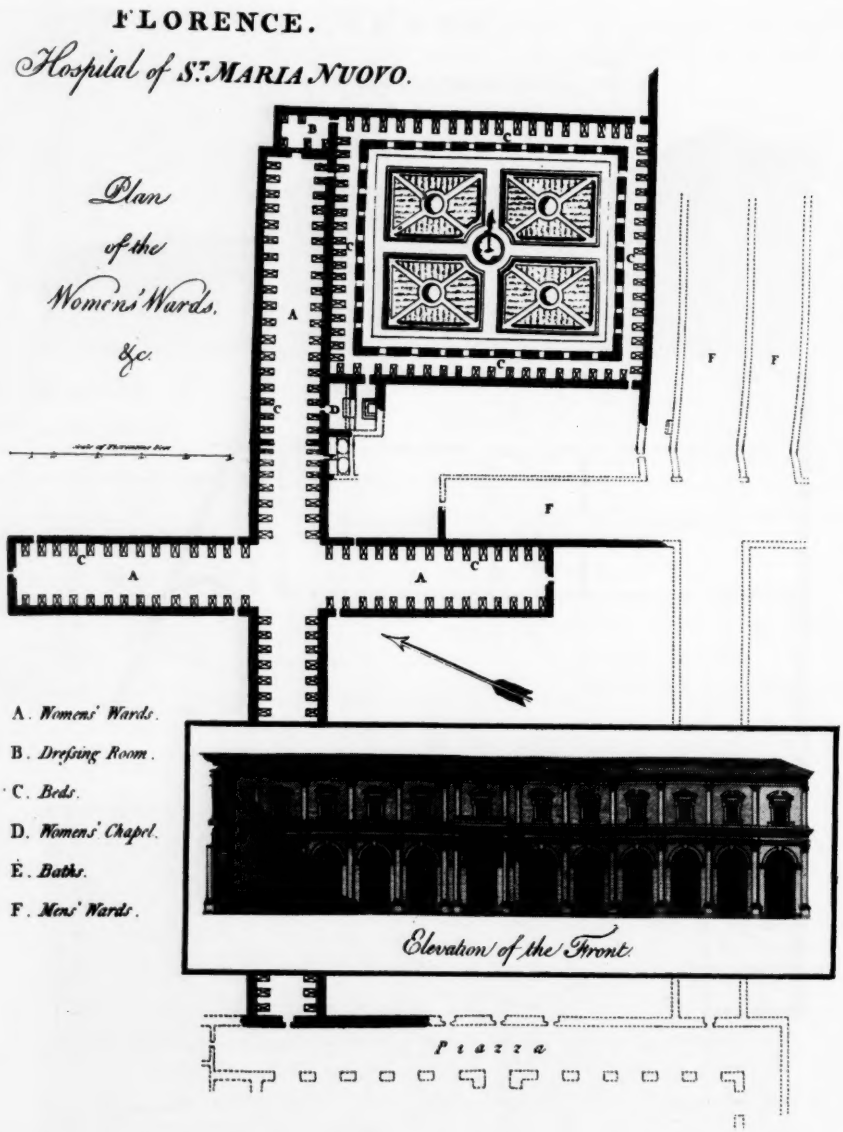


Interior of Hôtel Dieu, Antwerp.



entirely disappeared. It was recorded in 1546 that St. Mary Magdalen's hospital in Newcastle had once been used for leprosy, but "*since the sickness had abated, it was used for the comfort and help of poor people in times of pestilence.*" Lazar houses were converted to other uses.

Financing.—The financing of medieval hospitals was no easy task. The people of Europe in the thirteenth and fourteenth



centuries were almost completely destitute because of war, famine and disease. Although hospitals had been primarily established as charitable institutions, destitute persons were often pushed out of the hospital to make way for paying patients.

The chief support of hospitals came from kings, bishops, feudal lords and wealthy merchants. Historians seem to be agreed that the motives of the benefactors

were selfish, in that they hoped to reap spiritual benefits for themselves by obtaining the prayers of future generations. Early deeds and charters of English hospitals show that the duty of the donor was first to God, then to his neighbor and finally to himself. Thus Henry III established the hospital at Oxford, and Henry VII gave the great palace of Savoy on the Thames to serve as a hospital for the sick. Both were motivated by pity and a desire for prayers.

St. John's in Jerusalem and Other Historic Institutions.—In 550 A.D. the Emperor Justinian constructed the celebrated hospital of St. John in Jerusalem. It was this hospital that gave rise to the military orders of the warrior knights who figure so prominently in the crusades and afterward in Jerusalem, Rhodes, Malta and Germany.

Probably the oldest hospital still in existence is the Hôtel Dieu in Paris, established by Saint Landry, Bishop of Paris, about the year 600 A.D. It was probably one of the earliest medical centers, since it embraced many social activities and institutions in addition to its function of caring for the sick. This seniority is disputed by the Hôtel Dieu at Lyons, which appears to have been built in the sixth century. Some put the date at 542 A.D. The Council of Orleans mentioned this hospital.

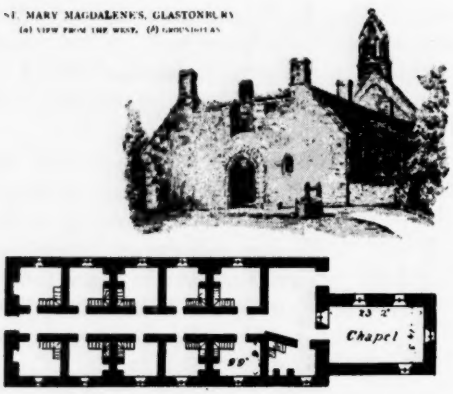
The Contributions of Islam.—In the fifth century the Islamic system of medicine seems to have arrived, having its beginning from the Nestorian School of Medicine of Gandisapora in Iran. With the spread of Islam to Asia, Africa and Spain, many excellent hospitals were constructed in Baghdad and in the Islamic empire. One is mentioned as existing in the eighth century in Cordova, in connection with the medical school, and the great Al-Mansur Hospital in Cairo, built in 1276, was outstanding for its excellence.

English Hospitals.—In a study of the medieval hospitals of England, Clay[6] observed that

> "a hospital was an ecclesiastical, not a medical institution. It was for care rather than cure; for the relief of the body when possible, but preeminently for the refreshment of the soul."

Records show that there were some hospitals in England prior to the Norman conquest. There was a Saxon hospital at

Woman's Hospital of Florence.

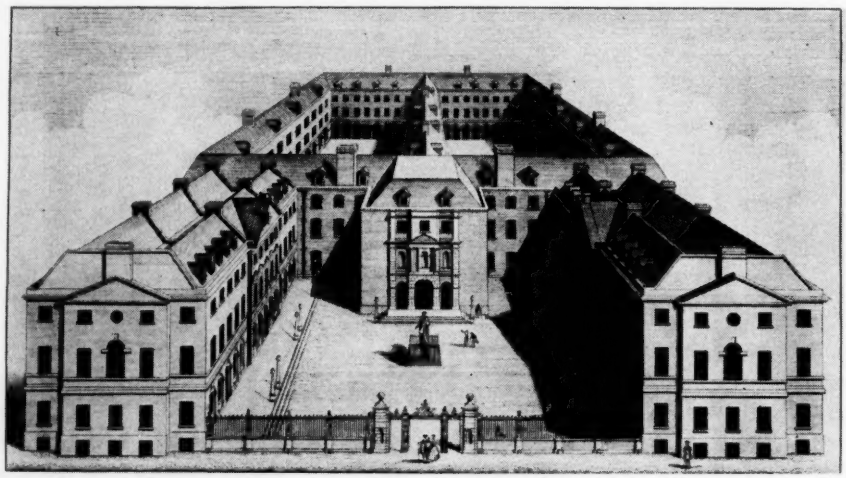


Mary Magdalene's, Glastonbury.

York, founded by Athelstane about 937 A.D., which was called St. Peter's. The oldest hospital in England whose records are accurate is Saint Bartholomew's in London, which was founded in 1123 by Rahere, described as a jester at the court of Henry I, who later became a priest. The motive for establishing this hospital is said to have been a vow of gratitude for deliverance from death. The financing of this project was undertaken by the founder himself. His good friend Alfune solicited funds from the people of London for the support of the institution, and he is probably the first hospital fundraiser as we know the profession today. St. Thomas' hospital in London claims greater antiquity.

Historians are not consistent about the causes and conditions that led to the royal edict abolishing hospitals operated by the church in England, but it is certain that dissolution of the monasteries by royal edict dealt a severe blow to English hospitals. King Henry VIII, in 1583, first gave over the management of St. Bartholomew's, St. Mary of Bethlehem and St. Thomas hospitals to the City of London upon the petition of the mayor and later granted a royal charter to St. Bartholomew's in 1546. These were apparently the only functioning hospitals in England until the early eighteenth century.

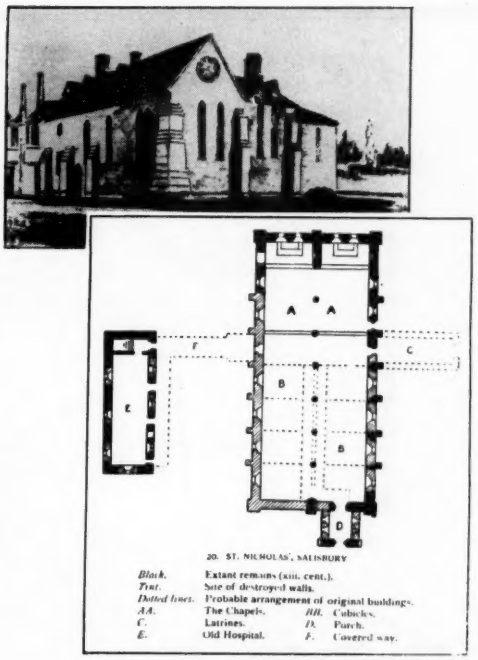
Architecture.—According to Dollman,[8] who wrote on the historical aspects of architecture, the medieval hospital was invariably associated with a chapel. One plan called for a great hall serving as an infirmary or dormitory, with a chapel at one end, all under one roof. The second



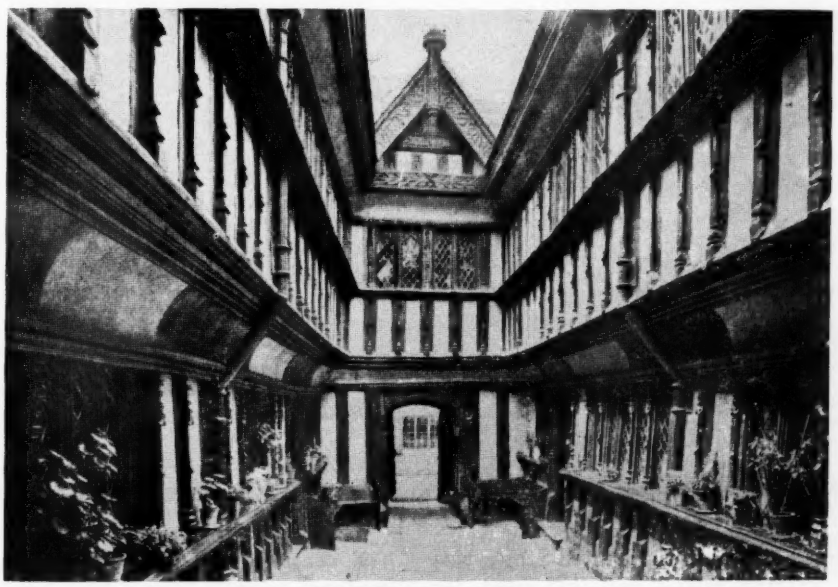
Guy's Hospital, London.

arrangement provided for a detached chapel in a separate building. A third plan similarly had a detached chapel, but the hospital was made up of a suite of buildings, usually quadrangular. Another type of hospital called for a narrow courtyard with rooms opening on both sides. A fifth plan, which persists until this day, is in the shape of a cross, like the ancient hospital of St. Mary Nuovo in Florence.

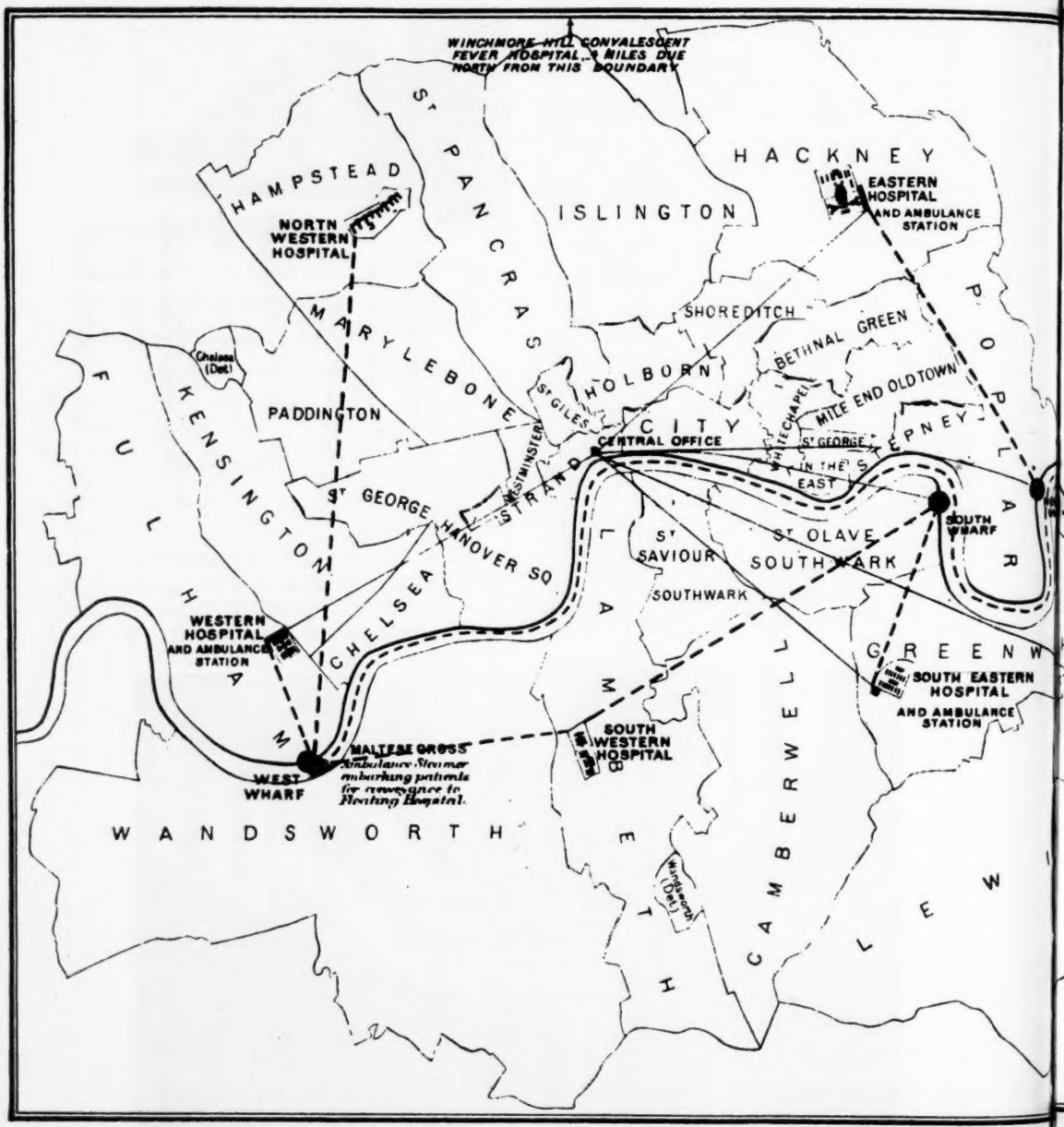
The general principles underlying these plans seem to have prevailed throughout Europe and were carried to America. Thus the ruins of the first hospital in America, founded at Santo Domingo by Commander Ovando in 1503, show that the hospital was adjacent to the chapel of St. Nicolas de Bari.[9] The oldest existing hospital in America, founded in Mexico City in 1524 by Cortez, similarly embodies the quandrangular principles of the hospital built around a courtyard. The first hospital in Canada, established in Quebec in 1630, was called Hotel Dieu de Precieux Sang.



St. Nicholas', Salisbury.

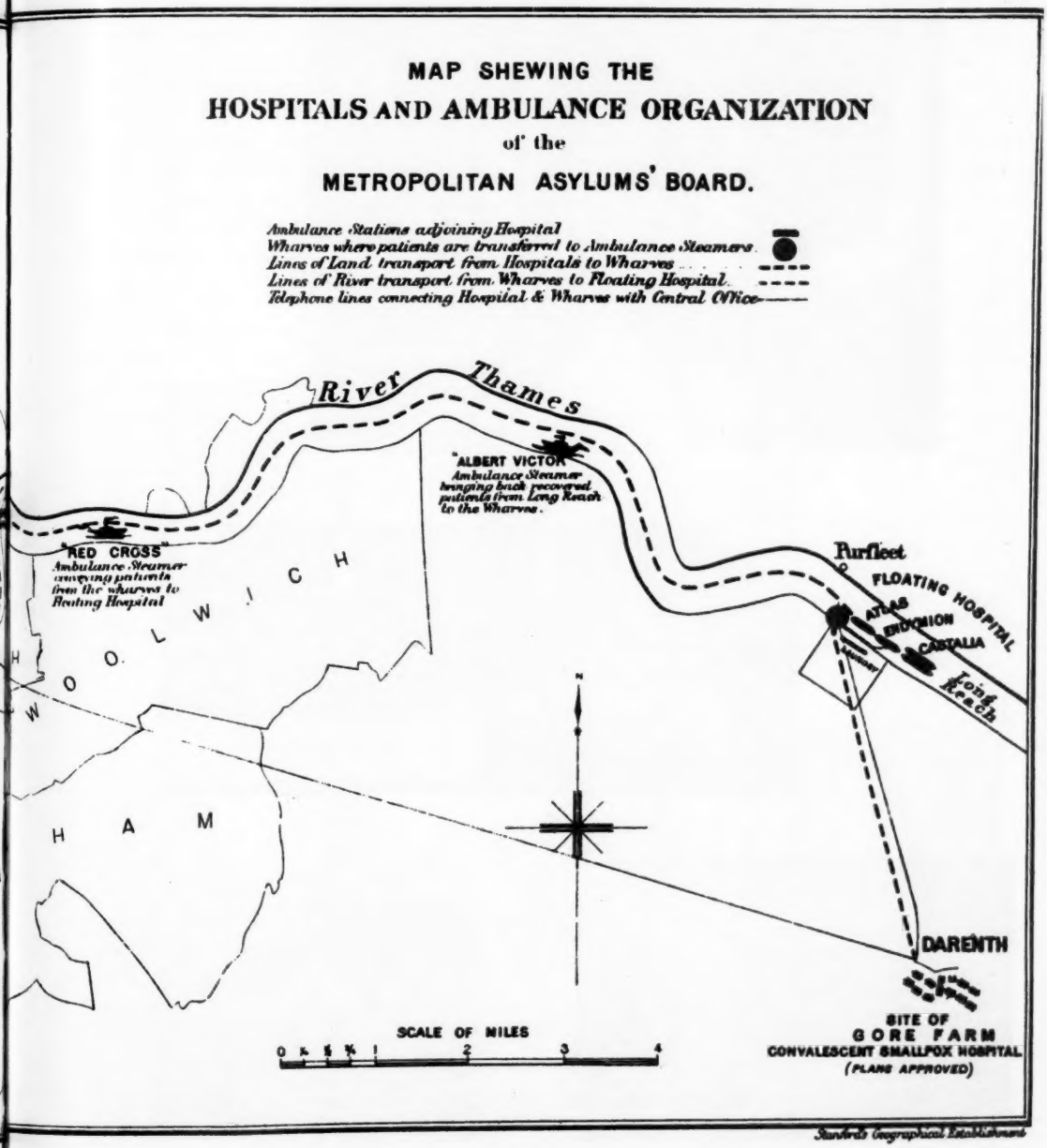


Ford's Hospital, Coventry.

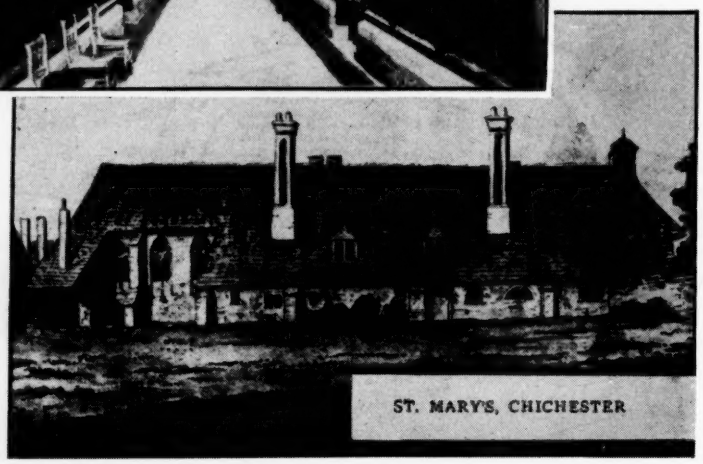


The first hospital in the United States was on Manhattan Island and was used for sick soldiers.[7]

Seventeenth Century.—The seventeenth century seems to have been remarkable only for the invention of the microscope

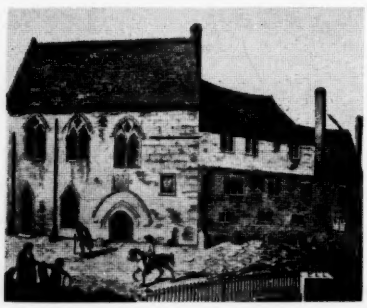


by van Leeuwenhoek—an achievement that affected hospitals profoundly two hundred years later. The quality of hospitals seems to have been very low at this time, and the plague recurred frequently. Most of the hospitals in the seventeenth century were



ST. MARY'S, CHICHESTER

Middlesex Hospital.



Hospital of St. Thomas, Canterbury, for care of pilgrims.

not hospitals at all but almshouses designed to get sick persons off the streets, where their presence offended those with sensitive consciences. Such hospitals as did exist were unheated and filthy, and they offered poor nourishment at best. Patients got better in spite of the care they received, not because of it.

Eighteenth Century.—The character of the hospital seems to have changed at the beginning of the eighteenth century. In addition to the church-supported hospitals, the voluntary hospital, supported by the citizens of the community, began to make its appearance in Great Britain and France. Municipal hospitals were also erected under the jurisdiction of stewards appointed by the city council.

In 1710 a Dublin doctor named Richard Steevens died, leaving his estate to build a hospital for *"curable sick people."* In 1728 Guy's Hospital in London was opened. Others followed soon after. It is significant that the voluntary hospitals of the time were designated for "curable poor people." The philosophy of the eighteenth century hospitals was socially constructive rather than merely charitable.

The oldest existing hospital in the United States is said to be the Philadelphia General Hospital, which evolved out of a public almshouse for the aged, infirm and insane. The first incorporated hospital in America was also established in Philadelphia. This was the Pennsylvania Hospital, which was actively supported by Benjamin Franklin. Its purpose was not charitable. It was designed as a place where Philadelphia physicians might treat their private patients. It was not the first hospital established for private patients; in many communities there were private hospitals owned and operated by physicians. The Pennsylvania Hospital, however, was the first institution in the United States incorporated for the cure of the physically and mentally ill without regard to economic status, race or creed. It can thus be regarded the first voluntary hospital in the United States. It is the proto-

Philadelphia General Hospital.

type for other voluntary nonprofit type of hospital as we know it today. The Pennsylvania Hospital received its charter from the King of England in 1751.

Despite the good intentions of the people to establish constructive institutions for the care of the sick and injured, it is a matter of record that the quality of patient care remained low because of the state of medical knowledge of the times. Far from curing illness, these eighteenth-century hospitals assisted in the spread of disease.

John Howard.—Filth and a fetid atmosphere were characteristic of the hospitals of this period. The vivid accounts of John Howard,[10] published in 1789, are worth examining. Garrison[11] wrote that his reform *"had much to do with the supression of that vermin-carried disease, typhus fever."* Of London hospitals, which nearly all required a deposit on admission, Howard says:

> "The visits of Governors are too often only a matter of form, the visitor hurrying out of an offensive room, and readily acquiescing in the reports of nurses, etc. Hence, I apprehend, many instances of neglect in surgeons and their dressers, as well as other officers, go unnoticed.
>
> "I have never found any clergyman administering consolation and admonition to the sick; and prayers are usually attended by very few.
>
> "White washing the wards is seldom or never practiced; and injurious prejudices against washing floors, and admitting fresh air, are suffered to operate.
>
> "Bathing, either hot or cold, is scarcely ever used; I suppose, because it would give trouble to the attendants."

Howard noted that Guy's Hospital in 1788 had several old wards with wooden beds and testers (canopies) infested with bugs. But it had excellent waterclosets, *"free from ill scents,"* and good procedures for medication. St. Thomas Hospital had fresh, clean wards but no water closets. Howard praised an order on surgical consultations but maintained that no amputation should be done without consultation with three medical gentlemen. Middlesex, he found, had rooms that were *"close and dirty." "The whole,"* he said, *"has an air of poverty."* He was sorry to see a written order that in purchase of goods *"a preference be given to tradesmen who are subscribers."*[12] St. Bartholomew's he found clean and not offensive except for the four foul wards for men, which had not one window open. He considered the allowance of bread too small. The beds had lofty testers, which harbored dust and were used to store unused or discarded articles. The wards had fifteen beds each. In 1788 the hospital contained 428 patients.

Not all hospitals were bad in those days. Of the Royal Hospital at Haslar, which he found "remarkably clean and quiet," Howard says:

> "All the nurses here, and in the hospital at Plymouth, are women, which is very proper as they are more cleanly and tender; and they more easily pacify the patients, who are seafaring men."

The Chester General Infirmary he also found "spacious and clean and the beds not crowded." Hospital ships were attached to the hulks that served as English prisons in seaport towns. Of the one on the Thames, Howard said that it was "cleaner and quieter than most of our country hospitals." He noted that Cashell, in Ireland, was very good and that the "governors duly attend." "When funds are low they reduce the surgeon's salary and raise it again when things get better."

The Greek hospital in Smyrna had large and airy wards, but the Turks themselves had very few.

> "Those Turkish hospitals for the sick are a sort of caravanseries, in one of which I saw many sick and dying objects lying on dirty mats on the floor. The surgeon seemed to be either extremely stupid or intoxicated with opium."

But amidst this neglect for human beings he found an asylum for cats near the mosque of San Sophia.

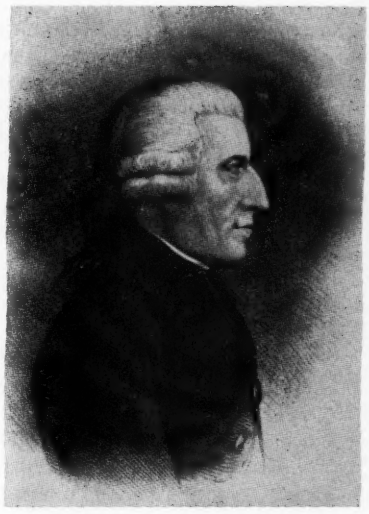
St. John of Jerusalem in 1786 had over 500 patients, served by "the most dirty, ragged, unfeeling and inhuman persons I ever saw. I found eight or nine of them highly entertained with a delirious dying patient." This hospital was understaffed, but there were more persons taking care of the prior's horses than cared for the patients. Howard noted: "The physician, in going his rounds, was obliged to keep a handkerchief to his face. The use of perfume I always reckon a proof of inattention to cleanliness and airiness." In the Hotel Dieu of Lyons, Howard found that

> "the summer white furniture of the beds was changed into a dirty blue harateen, with useless fringes, well fitted to retain infection. The rooms were nasty and offensive; and two patients in many of the beds but not one window open."

His visits to the Irish hospitals revealed a sad state of affairs. There were no baths in any that were visited. The inventory includes: Lisford, no sheets, no water; Omagh, patients 1 year in straw on the floor, few blankets, two patients sleeping in a bathtub, no water; Cavan County, a dunghill in the front court; Limerick, twopence a day for hospital diet but threepence a day for the criminals in an adjoining jail, and Carlow, sanded floors ("which I always consider an expedient to hide the dirt").

In the eighteenth century one finds emphasis on prevention of the spread of the plague by stringent public health measures. Howard's observations indicate that the word *lazaretto* did not describe a hospital. It referred to an institution of quarantine where travelers could be isolated for a time before they were permitted to enter the country. A lazaretto was actually a kind of prison, although hospital and burial facilities were usually associated with it.

Hôtel Dieu de Paris.—Howard's observations of French hospitals were corroborated by Dr. John Jones, an American who published a book in 1775 calling attention to the frightful conditions in European institutions. He charged that hospitals were crowded far beyond capacity and that the Hôtel Dieu in Paris frequently placed three to five patients in one bed, the convalescent with the dying, broken bones with infections. Jones was one of the founders of the Society of the New York Hospital, which was planned to have eight beds per ward, good ventilation and all the latest equipment.[7]



John Howard

These observations were corroborated in the same hospital by Tenon[13] who was commissioned by King Louis XVI to investigate hospitals in France. He reported:

> "The Commissioners saw convalescents in the same rooms as the sick, the dying, and the dead. They saw the dead and the living together, the room allotted to the insane near that of the unfortunate creatures who had suffered the most cruel operations and who can obtain no repose in the nieghborhood of these madmen, whose frantic cries are heard by day and night.

"The room where operations are performed—trepanning, cutting, amputating—contains at the same time those who are being operated on, those who are awaiting operations, and those who have already undergone them. The operations take place in the middle of the room itself.

"One sees there the preparations for the torture, one hears the cries of those who endure it; he who is to suffer tomorrow has before him the pictures of his future agonies; he who has passed through this terrible trial—imagine how deeply he will be moved by these cries of pain."

He advocated segregation and single beds. This sad state of affairs led Necker to sponsor and build, in 1789, the hospital in Paris that bears his name. It was designed to eliminate the evils described by Tenon. But, in general, however, these shocking revelations did little to change conditions in hospitals.

During the first half of the nineteenth century, hospitals probably were in worse condition than at any other time in history. This was mainly due to the prevailing medical theory that suppuration was desirable for getting the poison out of the patient's system. The formation of pus was encouraged. Discharging wounds made the atmosphere of hospital wards so offensive that perfume was often required to mask the odors of infection and gangrene. The surgical mortality rate was frequently as high as 90 per cent. It is small wonder that good nurses were rare. Only people who could not get jobs elsewhere would work in such surroundings.

With the change in medical attitude towards festering wounds and "*laudable*" pus there was much improvement in the quality of hospital care. The work of Semmelweis, Koch, Pasteur and the other great medical researchers brought about the realization that disease was caused by living microbes attacking the human body. Other great medical discoveries also had their influence on the development of hospitals.

Dr. Crawford Long's discovery, in 1840, of ether as an anesthetic agent revolutionized the nature and practice of surgery. The surgeon, who had formerly been esteemed for his speed, his skill and the strength of his brawny assistants, now had more time to perform his operations, because the patient no longer suffered pain. The discovery by Lord Lister that

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Charity Extended To ALL.

STATE of the *New-York Hoſpital* for the Year 1797.

certain chemicals would reduce infection led to the era of antisepsis in hospitals. Postoperative infection was greatly reduced by the application of these chemicals. Hospitals became safer, but they also acquired the *"hospital odor"* of antiseptics. Operating rooms began to be enlarged and expanded into operating suites. The anesthetist joined the surgical team.

About 1860, Rudolf Virchow, a German physician specializing in laboratory work, popularized the cell theory of disease first propounded by Schwann in 1839. Old concepts of the nature of illness were abandoned slowly. Laboratories for the study of cells were established, first in medical schools and later in hospitals. The first laboratory was opened in Berlin in 1860 and in the United States in 1890, in the Pennsylvania Hospital in Philadelphia. Soon thereafter every major hospital in the world had a laboratory.

Nursing.—The history of nursing is inextricably bound up with that of hospitals. The state of a hospital has always depended upon the quality of the nurses working there. The impact of Florence Nightingale upon the hospital scene is justly hailed as epoch-making. She was the person who did something about the things deplored by Howard, Jones and Tenon. She put Howard's recommendations into effect in Crimea seventy years after he made them. The present pattern of hospital cleanliness is mainly due to her efforts. One element of chance also aided her; she came along at the time when medical thinking no longer favored the formation of pus.

The oldest group of nurses of which we have records are the deaconesses who flourished in the third century A.D. but declined in the fourth and fifth centuries. They were revived in the nineteenth century. In 1836 Pastor Theodore Fleidner established a school for them in Kaiserwerth, Germany. This was where Florence Nightingale obtained her early training.

Florence Nightingale

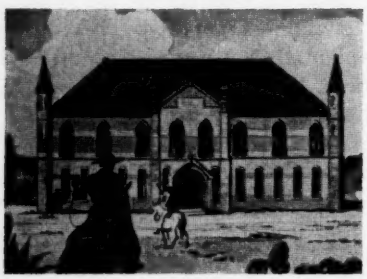
Reference is also made to nurses in the Code of Justinian. These were called *"parabolani"* and nursed patients with infectious disease. Historians also identify the Order of Our Lady of Mount Carmel in the eleventh century, organized to care for lepers. In the year 1097 was founded the order of the Hospitalieres of the Hôtel Dieu de Paris, who adopted the Augustinian rule and later, in 1217, merging with two other orders, became known as the Augustinian Sisters. It was in this famous hospital, too, that the order of the Daughters of Charity of St. Vincent de Paul originated in 1634. This order was transplanted to America by Mother Seton, where it has continued its ministrations to this day.

Burdett[1] wrote: *"before the year 1840 nurses were almost the worst set of working women; the only points to be settled on engaging a nurse were that she was not Irish and not a confirmed drunkard."* In 1840 a school for nursing was founded in

London by Elizabeth Fry under the patronage of Queen Adelaide. The success of Florence Nightingale in Crimea had resulted in her recognition as an authority on hospital organization and management. She was the first to establish schools of nursing as we know them today, selecting young ladies of good family as her first students so as to dignify the nursing profession by giving it new status to offset the bad reputation it acquired up to that time. Nursing school discipline was strict. The first Nightingale school of nursing was established in St. Thomas Hospital in London in 1860. Other countries followed this example, and schools of nursing were soon established in hospitals all over the world.

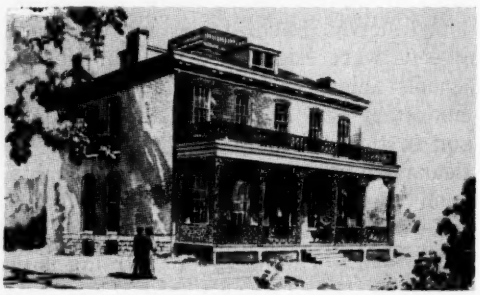
Another scientific discovery that changed the character of hospitals was the announcement of the roentgen ray by Wilhelm Conrad Roentgen in 1895. The medical implications of this force were soon realized. It became standard equipment in every hospital. Other medical discoveries, each in turn, had their impact upon the development of hospitals.

Special hospitals seem to have been built according to the needs of the times. They were well established in the time of Justinian. A hospital for the aged was built in Edinburgh in 1567; hospitals for the relief of patients with venereal disease (in Germany these were called French hospitals)



Santa Rosa Hospital, San Antonio; early history.

Montefiore Hospital, Pittsburgh; early history.



Missouri Baptist Hospital, St. Louis; early history.

was established in 1788; in Ireland nurseries for children 2 to 6 years of age were available in 1786. John Howard found the lying-in hospitals in London in good condition, clean and quiet. Women remained there for three weeks after delivery. Puerperal sepsis does not seem to have been the problem it became fifty years later.

Hospitals for the incurable flourished in 1734 and were still prominent in 1928, when the word "incurable" went out of fashion. Mental hospitals were always in existence but were known until very recently as lunatic asylums. They are still so referred to in many of our laws.

Fever and smallpox hospitals were also common in England and America. The latter went out at the turn of the twentieth century, when compulsory vaccination came in. "Fever hospitals" became insti-

tutions for infectious disease, and these, too, have gradually fallen into disuse. Burdett has given excellent account of the measures taken by the City of London to deal with an epidemic of smallpox, including the establishment of isolation hospitals on the outskirts of the town. When these failed to handle the volume of patients, floating hospitals in the form of warships were anchored in the river Thames to care for persons in isolation. Patients embarked in the city and were taken to the floating hospitals by means of ambulance steamers. Those who recovered from smallpox were sent to a convalescent smallpox hospital. There seem to be no reliable accounts of the kind of treatment actually given to patients in these floating hospitals.

Tuberculosis sanitariums were set up all over the United States as a result of the work of Trudeau, but these also are gradually declining. The original sanatorium in Saranac Lake, New York, has now closed its doors.

Growth of American Hospitals.—In the late nineteenth century, as in the early days of hospitals, religious forces assumed the leadership in hospital development. Hospitals according to the new pattern were established by Roman Catholic religious orders and by various Protestant denominations in the United States. At the same time, Jewish philanthrophic groups also developed a system of hospitals. Most of these were supported by special contributions from the members of the various congregations. Many notable public hospitals and privately owned hospitals were also developed all over the United States.

The nineteenth century also saw the founding of the American Medical Association in 1847. In 1905 its Council on Medical Education and Hospitals initiated a drive to produce better medical schools. In 1910 the report of Dr. Abraham Flexner on medical education resulted in better doctors in hospitals and improved mortality rates. The American Hospital Association was founded in 1898, the Catholic Hospital Association in 1915 and the American Protestant Hospital Association in 1921. In 1913 was formed the American College of Surgeons, which set up the first set of standards for hospitals. With this came an approval program, with inspections by representatives of the American College of Surgeons. The first report of inspections 1918 was suppressed, but from 1919 onward the program flourished.

Malcolm T. MacEachern, M.D.—The success of hospital standardization was largely due to Dr. Malcolm T. MacEachern, who took charge of the program in 1923, revised the standards frequently and eventually wrote the monumental textbook *Hospital Organization and Management,* which is still the authority in the field. This program was eventually handed over to the Joint Commission on Accreditation of Hospitals in 1952, representing the medical profession and the hospitals of the United States. Progress has been phenomenal. In 1919 only 89 hospitals were approved, in 1958 more than 3,200 met the minimum standards.

Hospital administration, too, has improved with the foundation of the American College of Hospital Administrators in 1934 and the foundation of the first school of hospital administration in 1929 by Father Charles Moulinier, S.J., in Marquette University, an example later followed by the University of Chicago, Northwestern University (founded by D. MacEachern), Columbia University, Minnesota University and others.

The types of patient in the hospitals have changed with each medical discovery. In 1923, insulin practically eliminated diabetes as a hospital disease; liver extract cut out pernicious anemia in 1929; sulfonamides reduced pneumonia and the in-

Malcolm T. MacEachern.

fectious diseases in 1935, and antibiotics completed the job in 1943. Rehabilitation brought patients of a new kind into the hospital in 1946, and from 1950 up to the time of writing chronic illness has become progressively more important as a hospital problem. The infectious diseases have passed on, leaving us to cope with the degenerative, the neoplastic and the traumatic illnesses. Old age has become a problem as the American average life expectancy now exceeds 65 years and is lengthening.

Prepayment.—Hospital financing has changed. Voluntary institutions depend no longer upon endowments, gifts or bequests, but mainly upon prepayment plans for hospitalization.

The Blue Cross movement began in Texas in 1929, gained momentum during the great economic depression from 1930 to 1940 and is now one of our chief sources of financial support. Under this system, Americans pay sums of money periodically into a central fund, which then undertakes to defray the full cost of hospitalization in any hospital associated with the plan. Associated hospitals agree to provide service at cost or below it. Commercial insurance plans in ever-increasing numbers defray the cost of hospitalization. Group health plans are in evidence in California (Permanente), New York (Health Insurance Plan) and many other cities. Some organizations operate their own hospitals (e.g., the United Mine Workers). Government also provides reimbursement for some citizens who cannot pay for their own hospitalization.

The capital cost of hospitals is now defrayed by the Federal government under the Hill-Burton law and, to some extent, by state matching funds. Government support of hospital construction has brought about some government regulation and licensing, which gradually increases as government inexorably tightens its grip on health services in the United States, as it has done in France and Great Britain and is now doing in Canada.

Outlook for the Future.—As our health improves and our life expectancy lengthens, new problems must be faced. Contemporary hospital architecture, developed from 1930 to 1950, no longer meets our needs. Existing hospital buildings require too many persons to operate in this day of personnel shortages. Architecture is changing to provide economy of motion and traffic flow. Intensive care units are being developed for the acutely ill, but the chronically ill are expected to do many things for themselves. The atomic age now demands protective features in every hospital.

Serious efforts must be made to operate hospitals with less personnel. Each year the proportion of payroll to the total expense of the hospital continues to increase. Approximately two-thirds of all the hospital costs are spent on wages and salaries. Hospitals must take a leaf out of the book of industry and replace persons with machines. The personal services rendered by doctors and nurses are not the main sources of money-spending in the hospital and they can never be supplanted by robots. There are many areas, nevertheless, in which improved design, construc-

tion, equipment, supplies, practices and procedures could eliminate many unnecessary members of our hospital staff.

As the people evolve, so also must evolution govern the hospital. This is a continuing and continuous process. Yesterday's hospital is obsolete. Today's hospital is obsolescent, and many still on the drawing boards will be obsolete by the time they are built. The hospital of tomorrow must be planned today, upon the basis of an intelligent forecast resulting from our experiences of yesterday. In the future, as in the past, hospitals will follow the needs of the people they serve.

Author's Note: Sincere thanks are extended to the editors and publishers of Hospital Management for permission to republish the illustrations that accompany this paper.

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The measure of a man's real character is what he would do if he knew he would never be found out.

—Macaulay

Occasions do not make a man either strong or weak, but they show what he is.

—Thomas á Kempis

Make the most of yourself, for that is all there is of you.

—Emerson

A man never shows his own character so plainly as by the way he portrays another's.

—Richter

Let us endeavor so to live that when we come to die, even the undertaker will be sorry.

—Mark Twain

New Books

BOOKS RECEIVED

The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

The Lower Extremity: Atlas of Anatomy and Surgical Approaches in Orthopedic Surgery, Vol. 2. By Rodolfo Cosentino. Springfield, Ill.; Charles C Thomas, Publisher, 1960. Pp. 264, with 139 ilustrations. *Reviewed in this issue.*

Importance of the Vitreous Body in Retinal Surgery, with Special Emphasis on Reoperation. Edited by Charles L. Schopens. St. Louis: The C. V. Mosby Company, 1960. Pp. 226, with 30 illustrations and 3 color plates. *Reviewed in this issue.*

Surgical Treatment of Trauma. Edited by Preston A. Wade, with contributions by 35 authors. New York and London: Grune & Stratton, 1960. Pp. 779. *Reviewed in this issue.*

A Clinical Prospect of the Cancer Problem (Introductory volume of **Monographs on Neoplastic Disease at Various Sites).** By D. W. Smithers. Baltimore: The Williams and Wilkins Company, 1960. Pp. 232, with 46 illustrations and 10 tables.

Les Cavités Cardiaques: Introduction Anatomique a la Chirurgie Intracardiaque (The Chambers of the Heart: An Anatomic Introduction to Intracardiac Surgery). By E. Henry, R. Courbier and P. Rochu, with a preface by R. de Venrijoul. Paris: Masson et Cie., 1960. Pp. 176, with 196 illustrations.

Thymectomy for Myasthenia Gravis. By Henry R. Viets and Robert S. Schwab. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 130, with 32 illustrations.

Experiences with Congenital Biliary Atresia. By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

Clinical Gastroenterology. By F. Avery-Jones and J. W. F. Gummer. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 652.

The Femoral Neck—Function, Fracture Mechanism, Internal Fixation: An Experimental Study. By Victor H. Frankel, Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 119, with 58 illustrations.

Congenital Malformations: A Ciba Foundation Symposium. Edited by G. E. W. Wolstenholme and C. M. O'Connor. Boston: Little, Brown and Company, 1960. Pp. 308, with 91 illustrations.

General Anesthesia for Neurosurgery. By Robert I. W. Ballantine. Boston: Little, Brown and Company, 1960. Pp. 152, with 68 illustrations.

Experiences with Congenital Biliary Atresia. By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

Calcium Metabolism and the Bone. By Paul Fourman. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 325, with 7 illustrations.

Chemical Osteosynthesis in Orthopaedic Surgery. By Michael P. Mandarino. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 72, with 36 illustrations.

Surgical Treatment of Trauma. Edited by Preston A. Wade, with contributions by 35 authors. New York and London: Grune & Stratton, 1960. Pp. 779.

During the past five years the faculty of Cornell University Medical College has presented an annual postgraduate course entitled "Fractures and other Trauma." Its purpose is to review comprehensively the current methods of treatment of injuries. This well-illustrated book is a compilation of the lectures given in this course by thirty-five different authors. It is divided into five sections: (1) General Principles of Treatment, (2) General Considerations of Fractures, (3) Injuries to the Head, Neck and Spine, (4) Chest and Abdomen, and (5) The Extremities. The editor is widely known for his work on fractures, and his interest in the broad field of trauma.

The short chapters on bone metabolism, anesthesia in the treatment of trauma and traumatic shock are good examples of the practical approach that characterizes most of the book. The chapter on burns might include a more detailed discussion of the current controversy with regard to blood and fluid therapy. Dr. Wade's chapters on the indications and technics for open reduction of fractures and the treatment of nonunion are excellent. The use of the Parham band, once practically obsolete, is returning to favor. The discussion of early mobilization of joints in the treatment of fractures echoes the teachings of Böhler and Watson-Jones. The danger of passive movement is emphasized. Fractures in children are treated by methods differing from those used in treating adults. The few types that require open reduction and the reasons for this need, are adequately discussed.

Separate chapters deal with the treatment of all the common and most of the uncommon fractures. Dr. Campbell's discussion of Colles' and Smith's fractures of the distal end of the radius should be read by all surgical residents, who may otherwise regard the treatment of these injuries as stereotyped. The early treatment of fractures and soft tissue injuries of the hand is discussed in two chapters. The section on management of injuries to the flexor tendon could be made more informative.

Tracheotomy is discussed in one brief but adequate chapter. Much more information could be included in the chapters on injuries to nerves, tendons and vessels. The indications and technics of anticoagulant therapy for trauma and the indications for its use are not included—a notable omission. Surgeons can criticize this book because of its emphasis on fractures, which perhaps reflects the major interests of the editor. The sections on thoracic and abdominal injuries could be much more comprehensive. "Excision of the entire duodenum" and "trapping of a loop of bowel between injured bony structures" are two phases that call for explanation. That a ruptured spleen may cause multiple splenic peritoneal implants seems to have no great importance, but the grave consequences of secondary or delayed splenic hemorrhage are not mentioned.

Spinal injuries are well considered, including early ambulation for patients with minor fractures. The controversial subject of surgical exploration of the cord for paraplegia after spinal fracture is thoroughly discussed, even to the observation that patients and relatives are rarely satisfied if exploration is not done. "Traumatic spondylolisthesis" is mentioned. The medicolegal implications of this term suggests that its diagnosis be clarified in future editions of the book.

Injuries to the ligaments of the knee and to the menisci and their treatment are well covered. An apparent contradiction involves two statements, that medial tears in the meniscus are almost always associated with injuries to the anterior cruciate ligament and, elsewhere, that if a torn anterior cruciate exists with a torn meniscus, removal of the meniscus will not return the joint to normal.

The field of the surgical treatment of

trauma is enormous, and no one volume can hope to do it complete justice. Perhaps "musculoskeletal" and "soft tissue" injuries should be discussed in two separate volumes, as in the handbooks of the American College of Surgeons, but the overlapping of injuries makes this difficult. Dr. Wade and his colleagues have collaborated in a valuable text that can be read with profit by all surgeons.

CHESTER C. GUY, M.D.

The Lower Extremity: Atlas of Anatomy and Surgical Approaches in Orthopedic Surgery, Volume 2. By Rodolfo Cosentino. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 264, with 139 illustrations.

Most of the illustrations in this book depict examples of expert and careful dissection. In addition to the anatomic information, emphasis is placed on surgical approaches to operations involving minute and detailed dissection. Identification of the structures is excellent and does not interfere with a good view of the dissection.

Since all of the dissections mentioned have been performed on cadavers, the relations of the various structures in their normal positions are demonstrated by dissection in layers. The book is a valuable work on anatomy as well as on numerous approaches in orthopedic surgery.

JAMES J. CALLAHAN, M.D.

Importance of the Vitreous Body in Retinal Surgery with Special Emphasis on Reoperation. Edited by Charles L. Schepens. St. Louis: The C. V. Mosby Co., 1960. Pp. 226, with 30 illustrations, including 3 color plates.

This book reports the transactions of the second conference on retinal problems, sponsored and conducted by the Retina Foundation of Boston. The conference took place at Ipswich, Massachusetts, on May 30 and 31, 1958. Attendance was by invitation. Aiming at representation of most schools of thought, forty participants were selected from the large number of clinicians and investigators principally interested in the problems related to retinal detachment. Of these forty participants, ten served as principal speakers and the rest as audience, questioners and discussers.

Zimmerman and Straatsma, of the Armed Forces Institute of Pathology, led off with new data on the anatomic relation between retina and vitreous. Macroscopic observations on fresh unfixed eyes, as well as microscopic observations with the light and the electron microscope, demonstrated intimate union between these two elements under normal conditions. Externally, toward the pigment epithelium, some adhesive union is provided by a substance characterized histochemically as an acid mucopolysaccharide.

The normal vitreous, according to Balazs of the Retina Foundation, corresponds to the intercellular substance of connective tissue, modified so as to keep the light path free from scattering, diffusing and absorbing elements.

The outstanding pathologic sign in the eye with retinal detachment, whether or not it has been operated on, is cellular proliferation either along the bare retinal surface or along residual vitreous still united with the retina. This proliferation causes the promotion of membranes, and these account for some of the fixed retinal folds observed clinically in cases of retinal detachment.

Further sections of the book deal with clinical data on the role of the vitreous in the pathogenesis of retinal detachment. Hruby, of Graz, Austria, contributes a chapter on biomicroscopic observations, and Schepens, of the Retina Foundation, a section on ophthalmoscopic observations. The binocular indirect ophthalmoscope has become the standard instrument for the study and observation of retinal detachment. Important clues and symptoms may be disclosed by indentation of the wall of the eyeball over the anterior portion of the eyeground.

Schepens cites a number of cases in which the unfavorable outcome can be largely attributed to gross iatrogenic perforations of the eyeball with large bore needles or similar instruments. Through such perforations episcleral tissue may invade the interior of the eye and set up undesirable proliferative processes within the vitreous.

Perforations of the wall of the eyeball are

entailed in the procedure of vitreous implantation advocated and presented at the conference by Shafer of New York. The discussion following his presentation revealed sharp discord with regard to the indications for vitreous implants. A cogent remark by one of the discussants, Rosenthal of Brooklyn, was to the effect that the classification of retinal detachments with regard to manageability and prognosis would become more uniform if several "detachment surgeons" organized a system by means of which they could examine each other's patients *prior* to operation.

The remaining sections deal with specific surgical procedures. The technic of lamellar scleral resection and its indications are described by Pischel of San Francisco. He favors scleral resection anterior to retinal breaks and relies on standard diathermy for closure. Placement of the resection behind the breaks, which greatly increases the difficulties and risks entailed in the operation, has not improved Pischel's percentage of successful results.

The so-called plombage operation, that is, indentation of the wall of the eyeball in the region of the tear by means of a plastic rod sutured onto the sclera, is described in detail by the originator of the method, Custodis of Germany. His most remarkable statement is that apposition between the retinal break and the diathermized choroid is not absolutely necessary for a surgically successful outcome.

The final chapter, by Okamura, dealing principally with the problems of reoperations, brings out the adaptability of Schepens' scleral buckling operation (by means of circling polyethylene tubes) to a great variety of clinical situations.

In a short summary, Schepens himself restates the principal point of disagreement. One group of surgeons relies largely on a reduction of the scleral shell area ("scleral shortening") while the other group considers infolding of the wall of the eyeball at the site of the retinal breaks the most essential feature of the operation.

Open discussions and question-and-answer periods made up the major portion of the conference, and they also predominate in the book. The reader will find them particularly helpful in analyzing the ideas held in May 1958 by some of the leaders in the field of surgical detachment of the retina. Therein lies the principal value of this readable, well organized and effectively illustrated book.

PETER C. KRONFELD, M.D.

The earth is so small that I was afraid of, some day, being waylaid by a bleareyed, swollen-faced, besmirched loafer, with no soles to his canvas shoes, and with a flutter of rags about the elbows, who, on the strength of old acquaintance, would ask for a loan of five dollars. You know the awful jaunty bearing of these scarecrows coming to you from a decent past, the rasping careless voice, the half-averted impudent glances—those meetings more trying to a man who believes in the solidarity of our lives than the sight of an impenitent death-bed to a priest.

—*Conrad*

Abstracts from Current Literature

Hyperparathyroidism, Parathyroid "Adenomas" and Peptic Ulcer. Spiro, H. M., Gastroenterol. 39:544, 1960.

This paper deals with the effect of hyperparathyroidism on the formation and maintenance of duodenal ulcer. In cases where the excess hormone has affected the gastric secretion it is imperative to relieve or mitigate the increased stimulation in order to obtain satisfactory results.

The author recalls the difference in human and animal gastric functions and considers this pertinent to the study.

The histologic character of the parathyroid gland is reviewed regarding the water-clear cell, the chief cell, and the oxyphil cell, and it is postulated that there may represent the juvenile, midmature and senile or mature forms, respectively, as one and the same from the evolutionary standpoint. The pathologic picture is described. A difference between hyperplasia and adenoma is that the latter has a well-defined capsule and the tendency to form acini. It appears to depend on relative association with the other parathyroid glands, for as a rule, if it is adenomatous, the remaining glands show no hyperplasia. More than one gland, therefore, should be studied by biopsy in order to identify general hyperplasia.

There is a notation that the water-clear cells are involved in primary hyperplasia and that the chief cells likewise are linked to this condition. Differentiation is possible, however, by the presence of renal disease in the majority of instances in which the chief cells are predominantly involved. Multiple "adenomas of the parathyroid glands" are more or less accepted as chief cell hyperplasia.

Animal studies are reviewed in relation to induced acute and chronic hyperparathyroidism, and changes are noted and compared with those occurring in man. The hormone is thought to increase gastric secretion. Hypercalcemia, therefore, can retard the healing of ulcers.

It is the author's opinion that this same acute hyperthyroidism is related to metastatic calcification in the stomach and that gastritis and achlorhydria result, whereas the chronic type of hyperparathyroidism appears to be associated with duodenal ulcers that are difficult to heal. Again, inhibition of gastric secretion is a result of decreased serum calcium content, and vice versa. An increase of gastric secretion appears to take place with an increased level of serum calcium. This assumption is well illustrated with specific blood calcium levels. The material apparently covers much of the known relations of calcium, gastric juice and ulcer.

PAUL M. BRIGGS, M.D.

Leukocytosis in Appendicitis in Older Persons. Hubbell, D. S., Barton, W. K., and Solomon, O. D., J.A.M.A. 175:139, 1961.

Elderly persons with appendicitis are apt to show variations from the classic disease patterns. Since the total leukocyte count has long been an important diagnostic feature in cases of acute appendicitis, a study was undertaken to determine what diagnostic value can be ascribed to this laboratory test when applied to the elderly. Differential white blood cell counts were not considered. The generally accepted limits were 5,000 to 10,000 leukocytes per cubic millimeter of blood, and the count of 10,000 per cubic millimeter or more was considered significant.

A study was made of 150 patients with appendicitis. Of these, 100 patients were 50 years old or older. Fifty patients aged 30 to 39 years were used as controls. A leukocyte count below 10,000 per cubic millimeter of blood was noted in 30 per cent of the 100 patients aged 50 or more and in 14 per cent

of the younger group. It was interesting to note the high percentages with normal counts even after twenty-four hours.

Of the 70 patients with leukocytosis, 35.8 per cent complained of chills and fever, whereas only 16.7 per cent of those with normal counts did so.

Relation to Extent of Disease: This revealed that (a) of 30 patients with abscess or local peritonitis, 33.3 per cent had normal total white blood cell counts; (b) of 12 patients with diffuse peritonitis, the leukocyte count in 25 per cent was normal; (c) of 46 patients with gross perforation, 38.3 per cent had a normal total leukocyte count, and (d) of 54 patients with appendicitis only, 31.8 per cent had a normal count.

Relation to Mortality Rate: Of the patients with low leukocyte counts, 1 died; of those with leukocytosis, 6 died.

No relationship between age and leukocytosis could be demonstrated.

Histologic examination of the appendix showed leukocytosis similar to that observed in the control group.

Possible explanations are offered for the failure of leukocytosis to appear.

MORRIS W. GREENBERG, M.D.

The Surgical Treatment of Congenital Glaucoma. Kiffney, G. T. Jr., Meyer, G. W., and McPherson, S. D. Jr., Southern M. J. 53:989, 1960.

This paper is directed to the average ophthalmologist who encounters developmental glaucoma infrequently and therefore only occasionally operates for this condition. The authors modestly refer to themselves as such surgeons. They present the results and complications of 65 operations for congenital glaucoma over a period of ten years.

Congenital glaucoma is defined as "an increase in intraocular pressure manifested during the first three years of life, and due to an ocular defect at birth."

With the patient under ether anesthesia, the intraocular pressure (Schiotz) and the horizontal corneal diameter were measured.

The criteria for determining which of the authors' three technics was indicated in each case are not elucidated. These three procedures are (1) goniotomy, (2) goniopuncture and (3) combined goniotomy and goniopuncture.

The operations were performed without a gonioscopic lens, since the authors found the lens "unwieldy" and noted that it did not improve the ultimate results of surgical treatment.

Postoperative intraocular tension and corneal diameter were measured at two weeks, 1 month, three months, six months and annually. If progression was noted at any of these examinations, a second operation was performed. Using as their standard of surgical success an intraocular pressure of less than 25 mm of mercury (Schiotz, 1955 scale) and no corneal enlargement, the authors present their results in three tables headed respectively; Primary Procedure, Secondary Procedure and Third Procedure.

Of 33 eyes with congenital glaucoma, final normalization of tension for at least three months was obtained in 30. All failures occurred in eyes with a corneal diameter greater than 14 mm.

Surgical complications are presented in tabular form, hyphemia being the one most frequently encountered.

The ingenious discussion by the authors should interest all ophthalmic surgeons and offer encouragement to the "occasional operator."

ROBERT F. AZAR, M.D.

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Eaton Laboratories	60
Coreco Research Corporation	61
E. R. Squibb & Sons	62
E. R. Squibb & Sons	63
Doho Chemical Corporation	65
Dynamics Corporation of America	66
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Aeroplast Corporation	78
Eisele & Company	79
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LEONARD A. SHEPANEK, M.D., F.I.C.S.
Chicago, Illinois
Chairman

Monday, May 15
INSTRUCTIONAL COURSES

Athletic Injuries of Joints

DR. ROBERT C. BECHTOL, Santa Rosa, California
DR. MACK L. CLAYTON, Denver, Colorado

Surgical Problems of the Foot

DR. CHESTER C. SCHNEIDER, Milwaukee, Wisconsin
DR. PALMER EICHER, Indianapolis, Indiana

Children's Orthopedics

DR. JOSEPH H. KITE, Atlanta, Georgia
DR. HERBERT E. HIPPS, Waco, Texas

The Painful Hip

DR. EUGENE L. JEWETT, Orlando, Florida

GENERAL ASSEMBLY PRESENTATIONS

Panel Discussion
Surgery of the Hand
Moderator
DR. WALTER C. GRAHAM, Santa Barbara, California
Participants
DR. WILLIAM EDWARD BROWNE, Boston, Massachusetts
DR. MACK L. CLAYTON, Denver, Colorado
DR. IRVING REDLER, New Orleans, Louisiana
DR. CLARENCE MONROE, Chicago, Illinois

Distinguished Guest Lecture
The Concept of "Emergency with Delayed Operation" in the Wounds of the Limb
DR. MARC ISELIN, Paris, France

Tuesday, May 16
INSTRUCTIONAL COURSES

Fractures in Children

DR. WALTER P. BLOUNT, Milwaukee, Wisconsin

Shoulder Cuff Injuries

DR. JAMES E. BATEMAN, Toronto, Canada
DR. GRAHAM A. KERNWEIN, Rockford, Illinois

Amputations

DR. CLAUDE LAMBERT, Chicago, Illinois
DR. ROBERT THOMPSON, Chicago, Illinois

Panel Discussion
Use of Internal Fixation in Fractures
Moderator
DR. NEWTON C. MEAD, Evanston, Illinois
Participants
DR. ROGER ANDERSON, Seattle, Washington
DR. WILLIAM A. BISHOP, JR., Phoenix, Arizona
DR. IRVING REDLER, New Orleans, Louisiana
DR. NICHOLAS GIANNESTRAS, Cincinnati, Ohio

Wednesday, May 17
INSTRUCTIONAL COURSES

Cervical Spine Injuries
Moderator
DR. CHARLES HECK, Chicago, Illinois
Participants
DR. ANTHONY F. DEPALMA, Philadelphia, Pennsylvania
DR. RUTH JACKSON, Dallas, Texas
DR. EDWIN W. AMYES, Linwood, California

Bone Tumors—Expanding Lesions

DR. CRAWFORD J. CAMPBELL, Albany, New York

Elbow Fractures

DR. JAMES E. SEGRAVES, Chicago, Illinois

Panel Discussion
Conservative and Operative Treatment of Low Back Problems
Moderator
DR. ANTHONY F. DEPALMA, Philadelphia, Pennsylvania
Participants
DR. ROGER ANDERSON, Seattle, Washington
DR. WILLIAM A. BISHOP, JR., Phoenix, Arizona
DR. GARRETT PIPKIN, Kansas City, Missouri

Preliminary Program
Section on Colon and Rectal Surgery

FRANCIS D. WOLFE, M.D., F.A.C.S., F.I.C.S.
Chicago, Illinois
Chairman

JAMES P. FLEMING, M.D., F.I.C.S.
Rochester, New York
Co-Chairman

Tuesday, May 16

1:30-2:30

Presiding
DR. FRANCIS D. WOLFE, Chicago, Illinois

Secretaries
DR. JAMES P. FLEMING, Rochester, New York
DR. TIMOTHY F. MORAN, Scranton, Pennsylvania

Panel Discussion
Management of Diverticula of the Colon

Moderator
DR. LESTER JOHNSON, San Jose, California

Participants
DR. OTTO P. GRIFFIN, Fort Worth, Texas
DR. MIGUEL VOLIENTE, Puerto Rico
DR. CURTICE ROSSER, Dallas, Texas
DR. J. F. WENZEL, Detroit, Michigan
DR. MANUEL E. LICHTENSTEIN, Chicago, Illinois

2:30-3:30

Presiding
DR. JAMES P. FLEMING, Rochester, New York

Panel Discussion
Cancer of the Colon

Moderator
DR. GEORGE H. THIELE, Kansas City, Missouri

Participants
DR. CLAUDE J. HUNT, Kansas City, Missouri
DR. PETER ROSI, Chicago, Illinois
DR. DON C. ROBERTSON, Orlando, Florida
DR. BURCHARD E. WINNE, Toledo, Ohio
DR. HAROLD O. HALLSTRAND, Miami, Florida

4:00-5:30

Presiding
DR. TIMOTHY F. MORAN, Scranton, Pennsylvania

The Closed Hemorrhoidectomy
DR. LYNN A. FERGUSON, Grand Rapids, Michigan

Panel Discussion
Management of the Common Anorectal Entities

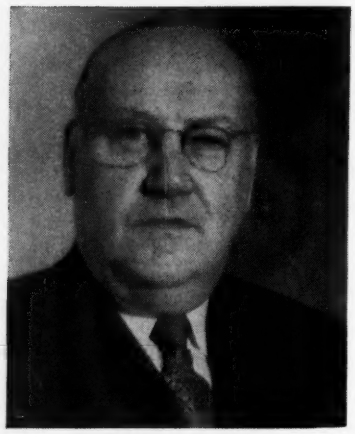
Moderator
DR. RAYMOND J. JACKMAN, Rochester, Minnesota

Participants
DR. CHARLES POPE, Evanston, Illinois
DR. HENRY C. SCHNEIDER, Philadelphia, Pennsylvania
DR. TIMOTHY F. MORAN, Scranton, Pennsylvania
DR. DONALD GRILLO, South Bend, Indiana

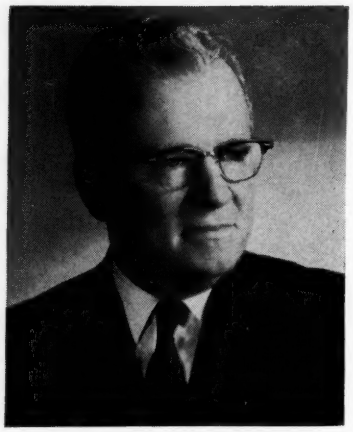
Thursday, May 18

Presiding
DR. VALENTINE R. MANNING, Philadelphia, Pennsylvania

Secretary
DR. HOWARD D. TRIMPI, Allentown, Pennsylvania



Dr. Francis D. Wolfe



Dr. James P. Fleming

1:30-3:30

Panel Discussion

Pediatric Problems in Proctology

Moderator

DR. GEORGE L. BECKER, Paterson, New Jersey

Participants

DR. MARK M. MARKS, Kansas City, Missouri
DR. ROBERT D. MERCER, Cleveland, Ohio
DR. JOHN G. MATT, Tulsa, Oklahoma
DR. EDWARD R. MCKAY, Salt Lake City, Utah

Management of Advanced Radiation Proctitis

DR. JACK W. MCELWAIN, Amityville, New York

Diagnosis and Management of Benign Tumors of the Colon and Rectum

DR. JOHN F. KEANE, Brookline, Massachusetts

Management of Pruritus Ani

DR. JOSEPH F. MONTAGUE, New York City

4:00-5:30

Endoscopic Procedure in Proctology

DR. S. W. EISENBERG, Philadelphia, Pennsylvania

Diverticulitis of the Large Bowel

DR. PAUL T. CARROLL, Columbus, Ohio

Panel Discussion

Management of Anorectal and Colonic Fistulas

Moderator

DR. FRANK H. MURRAY, Philadelphia, Pennsylvania

Participants

DR. CHESTERFIELD HOLLEY, Wheeling, West Virginia
DR. G. L. KRATZER, Allentown, Pennsylvania
DR. VALENTINE R. MANNING, Philadelphia, Pennsylvania
DR. EDWARD J. LOWELL, Phoenix, Arizona

GENERAL ASSEMBLY PRESENTATIONS

Wednesday, May 17, 2:00 P.M.

Panel Discussion

Management of Ulcerative Colitis

Moderator

DR. CURTICE ROSSER, Dallas, Texas

Participants

DR. MILTON BOHROD, Rochester, New York
DR. PARKER E. HAYDEN, Boston, Massachusetts
DR. JOSE RAMIREZ D., Guayaquil, Ecuador

Surgical Implications of Collagen Diseases

DR. MILTON BOHROD, Rochester, New York

Preliminary Program
Section on Ophthalmologic and Otolaryngologic Surgery

Session on Ophthalmology

Monday, May 15

2:00 P.M.

Presiding

CLARENCE H. ALBAUGH, M.D., F.A.C.S., F.I.C.S., Los Angeles, California

Secretary

RICHARD A. PERRITT, M.D., F.I.C.S., Chicago, Illinois

Eye Study Club
Odds and Ends in Ophthalmic Surgery

Moderator

PAUL C. CRAIG, M.D., F.A.C.S., F.I.C.S., Reading, Pennsylvania

Participants

PETER C. KRONFELD, M.D., F.I.C.S. (Hon.), Chicago, Illinois; Professor and chairman of the Dept. of Ophthalmology, University of Illinois College of Medicine; Chief Ophthalmologist, Illinois Eye and Ear Infirmary

DEWEY KATZ, M.D., Hartford, Connecticut; Attending Ophthalmologist, McCook Memorial Hospital, Hartford; Consulting Ophthalmologist, New Britain General and Windham Community Memorial Hospitals

ABRAHAM SCHLOSSMAN, M.D., F.A.C.S., New York City; Clinical Associate Professor, State University of New York College of Medicine; Senior Assistant Surgeon and Director, Motor Anomalies, New York Eye and Ear Infirmary

Proptosis and Other Signs of Glandular Dysfunction

A. D. RUDEMANN, M.D., F.A.C.S., Detroit, Michigan; Professor of Ophthalmology, Wayne State University College of Medicine

Practical Management in the Ophthalmologist's Office (Motion Picture)

HAROLD D. BARNSHAW, M.D., Camden, New Jersey; Assistant Professor, Graduate School of Ophthalmology; Chief Ophthalmologist, Cooper Hospital, Camden; Chief Attending Ophthalmologist, Zurbrug Hospital; Assistant Surgeon, Wills Eye Hospital, Philadelphia, Pennsylvania

Fractures About the Orbit

HEROLD B. GRIFFITH, M.D., Chicago, Illinois; Assistant Attending Surgeon, Chicago Wesley Memorial Hospital; Attending Plastic Surgeon, Children's Memorial Hospital

Ophthalmologic Problems Associated with Systemic Disease

ROSCOE J. KENNEDY, M.D., F.A.C.S., Cleveland, Ohio; Head of Cleveland Clinic Foundation, and Cleveland Clinic Hospital

Session on Otolaryngology

Tuesday, May 16

2:00 P.M.

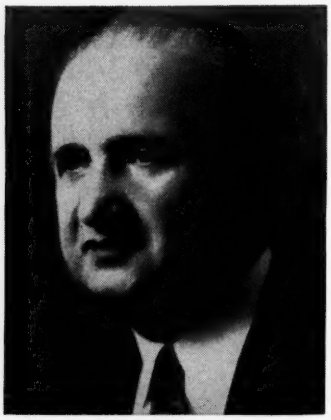
Presiding

FRANCIS L. LEDERER, M.D., F.A.C.S., F.I.C.S. (Hon.), Chicago, Illinois

Secretary

EMANUEL SKOLNIK, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

RICHARD A. PERRITT,
M.D., F.I.C.S.
Chicago, Illinois
Chairman
Ophthalmologic Surgery



LOUIS SAVITT,
M.D., F.I.C.S.
Chicago, Illinois
Chairman
Otolaryngologic Surgery

Surgical Pathology of Cholesteatoma

RICHARD BUCKINGHAM, M.D., Chicago, Illinois; Assistant Professor, Department of Otolaryngology, University of Illinois College of Medicine; Attending Otolaryngologist, Staffs of Resurrection and Presbyterian-St. Luke's Hospitals

Present Techniques in Ear Surgery—Stapes Surgery

JAMES L. SHEEHY, M.D., Los Angeles, California; University of Southern California School of Medicine

Assessment of Vestibular Testing

NICHOLAS TOROK, M.D., Chicago, Illinois; Clinical Assistant Professor, Department of Otolaryngology, University of Illinois College of Medicine

The Function of the Pathologic Larynx (Motion Picture)

HANS V. VON LEDEN, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois; Associate Professor, Otolaryngology, Northwestern University Medical School; Attending Otolaryngologist, Chicago Wesley Memorial Hospital; President, Institute of Laryngology and Voice Disorders

Positional Vertigo

MARTIN SPECTOR, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania; Director, Vertigo Clinic, Temple University Hospital; Chief, Kensington and Northeastern Hospital

Thursday, May 18

2:00 P.M.

Presiding

FRANCIS L. LEDERER, M.D., F.A.C.S., F.I.C.S. (Hon.), Chicago, Illinois

Secretary

LOUIS SAVITT, M.D., F.I.C.S., Chicago, Illinois

Conference

Techniques in Management of Tumors of the Head and Neck

Moderator

EMANUEL M. SKOLNIK, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois; Associate Professor, Department of Otolaryngology, University of Illinois College of Medicine; Otologist, Cleft Palate Center

Participants

ARTHUR LOEWY, M.D., Chicago, Illinois; Assistant Professor, Department of Otolaryngology, University of Illinois College of Medicine

JOSEPH G. SCHOOLMAN, M.D., F.A.C.S., Chicago, Illinois; Clinical Associate Professor, Department of Otolaryngology, University of Illinois College of Medicine

ARTHUR L. RATKO, M.D., Chicago, Illinois; Clinical Assistant Professor, Department of Otolaryngology, University of Illinois College of Medicine

BURTON J. SOBOROFF, M.D., F.A.C.S., Chicago, Illinois; Associate Professor, Department of Otolaryngology, University of Illinois College of Medicine

G. KENNETH LEWIS, M.D., F.A.C.S., Chicago, Illinois; Associate Professor, Department of Otolaryngology, University of Illinois College of Medicine

MAURICE F. SNITMAN, M.D., F.A.C.S., Chicago, Illinois; Associate Professor, Department of Otolaryngology, University of Illinois College of Medicine

GENERAL ASSEMBLY PRESENTATIONS

Panel Discussion

Preoperative and Postoperative Respiratory Function Tests

Moderator

MAURICE COTTLE, M.D., F.I.C.S., Chicago, Illinois; Professor, Department of Otolaryngology, Chicago Medical School; Attending, Illinois Masonic Hospital

Participants

Nasal Aspects

MAURICE COTTLE, M.D., F.I.C.S., Chicago, Illinois

Bronchopulmonary Aspects

ALBERT ANDREWS, M.D., Chicago, Illinois; Clinical Associate Professor Bronchoesophagology, Department of Otolaryngology, University of Illinois College of Medicine

Thoracic Aspects

GEORGE W. HOLMES, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois; Surgical Department, Northwestern University Medical School

Medical Aspects

DAVID CUGELL, M.D., Chicago, Illinois; Assistant Professor of Medicine, Northwestern University Medical School

Joint Session
Ophthalmology and Otolaryngology

Wednesday, May 17

12:15-1:45

Luncheon and Business Meeting

Presiding

CLARENCE H. ALBAUGH, M.D., F.A.C.S., F.I.C.S., Los Angeles

Secretary

GEORGE ZUGSMITH, M.D., F.A.C.S., San Pedro, California

2:00-3:00

Scientific Program

Refinements in Ophthalmic Surgery

ABRAHAM SCHLOSSMAN, M.D., F.A.C.S., New York City; Clinical Professor, State University of New York College of Medicine; Senior Assistant Surgeon and Director, Motor Anomalies, New York Eye & Ear Infirmary

Scholarship Grant Essay

Fibrinolysis in the Anterior Chamber of the Rabbit's Eye

EDWARD SCHAEFFER, A.B., State University of Iowa Hospital, Iowa City, Iowa

3:20-4:45

Aspiration Technique of Soft Cataract Combined With Contact Lens Use

J. MYRON MIDDLETON, M.D., F.I.C.S., Beverly Hills, California; Attending staffs, Temple and Cedars of Lebanon Hospitals

Surgery of Retinal Detachment

DONALD M. SHAFER, M.D., F.A.C.S., New York City; Assistant Professor, Clinical Surgery, Cornell University College of Medicine; Surgeon Director, Manhattan Eye & Ear Hospital

Fundus Disease, the Disc and Peripheral Retina

ALBERT N. LEMOINE, JR., M.D., F.A.C.S., Kansas City, Missouri; Professor and Chairman, Department of Ophthalmology, University of Kansas School of Medicine

Micro Ophthalmic Surgery

RICHARD A. PERRITT, M.D., F.I.C.S., Chicago, Illinois; Attending Surgeon, Department of Ophthalmology, Chicago Wesley Memorial Hospital; Attending, Cook County Hospital

Preliminary Program
Section on Obstetric and Gynecologic Surgery

WILLIAM J. BLACKWELL,
M.D., F.I.C.S.
Chicago, Illinois
Chairman

The Gross Pathologic Diagnosis and Clinical Management of Ovarian Enlargement

JOHN G. BOUTSELIS, M.D., Columbus, Ohio; Chairman, Department of Obstetrics and Gynecology, Mt. Carmel Hospital

Delivery Following Cesarean Section

ROBERT A. COSGROVE, M.D., Jersey City, New Jersey; Professor, Department of Gynecology and Obstetrics, Seton Hall College of Medicine and Dentistry

A Clinical Analysis of Diagnostic Tests for Family Spacing

EDUARD EICHNER, M.D., Cleveland, Ohio; Director of Research in Obstetrics and Gynecology, Mt. Sinai Hospital

Discussion of Dr. Eichner's Paper

A. HURTIG, M.D., Ottawa, Ontario, Canada; Associate Professor of Gynecology, University of Ottawa

Recent Advances in Obstetric Analgesia and Anesthesia

JOHN J. BONICA, M.D., Tacoma, Washington; Professor and Executive Officer, Department of Anesthesiology, University of Washington

The Effects of Irradiation Relative to Obstetrics and Gynecology

IRWIN H. HERSKOWITZ, M.A., PH.D., St. Louis, Missouri; Associate Professor of Biology, St. Louis University

Variability in the Diagnosis of Carcinoma in Situ of the Cervix

EDWARD SIEGLER, M.D., Garfield Heights, Ohio; Director of Laboratories

Outpatient Uterine Curettage Under Local Anesthesia

WILLIAM F. MENGERT, M.D., Chicago, Illinois; Professor and Head of the Department of Obstetrics and Gynecology, University of Illinois College of Medicine

The Postpartum Psychosis

RICHARD M. STEINHILBER, M.D., Rochester, Minnesota; Mayo Clinic; Staff Consultant, St. Mary's and Methodist-Worrall Hospitals

Panel Discussion

What is the Beginning of Carcinoma and What is the Beginning of Host Resistance?

Moderator

DR. FREDERICK FALLS, M.D., Chicago, Illinois; Emeritus Head, Department of Obstetrics, University of Illinois College of Medicine

GENERAL ASSEMBLY PRESENTATIONS

Removal of Normal Ovaries at the Time of Hysterectomy

CLYDE L. RANDALL, M.D., Buffalo, New York; Professor of Obstetrics and Gynecology, University of Buffalo School of Medicine

Techniques of Radical Pelvic Surgery

ALEXANDER BRUNSCHWIG, M.D., New York City; Clinical Professor of Surgery, Cornell University Medical College; Chief, Gynecologic Service, Memorial Center for Cancer and Allied Diseases

Action of the Uterus

ROBERTO CALDEYRO-BARCIA, M.D., Montevideo, Uruguay; Chairman, Obstetrical Physiological Service, Faculty of Medicine, University of Montevideo

Some General Assembly Participants

DR. ARTHUR F. ALVAREZ
Trail, B.C., Canada

DR. ALBERT ANDREWS
Chicago, Illinois

DR. CHARLES P. BAILEY
New York City

MR. J. N. BARRON
Salisbury, England

DR. MILTON BOHROD
Rochester, New York

DR. M. LEOPOLD BRODNY
Chicago, Illinois

DR. WILLIAM EDWARD BROWNE
Boston, Massachusetts

DR. ALEXANDER BRUNSCHWIG
New York City

PROF. VERNON BRYSON
New Brunswick, New Jersey

DR. ROBERTO CALDEYRO-BARCIA
Montevideo, Uruguay

DR. MACK L. CLAYTON
Denver, Colorado

DR. EDWARD L. COMPERE
Chicago, Illinois

DR. RALPH R. COFFEY
Kansas City, Missouri

DR. MAURICE H. COTTLE
Chicago, Illinois

DR. DAVID W. CUGELL
Chicago, Illinois

COL. STERRETT E. DIETRICH
U. S. Army

PROF. A. MARIO DOGLIOTTI
Torino, Italy

DR. WOLF ELKAN
New York City

DR. FREDERICK FALLS
Chicago, Illinois

DR. BERNARD GOTTFRIED
Port Washington, New York

DR. WALTER C. GRAHAM
Santa Barbara, California

DR. HAROLD O. HALLSTRAND
South Miami, Florida

DR. EDWIN PARKER HAYDEN
Boston, Massachusetts

DR. GEORGE W. HOLMES
Chicago, Illinois

DR. MARC ISELIN
Paris, France

DR. ARNOLD S. JACKSON
Madison, Wisconsin

DR. HENRY JAFFE
Los Angeles, California

DR. CHAUNCEY D. LEAKE
Columbus, Ohio

DR. ZBIGNIEW LEWICKI
Montreal, Canada
Resident Award

DR. EDWARD M. LITIN
Rochester, Minnesota

DR. JOHN S. LUNDY
Chicago, Illinois

DR. HUGH C. MACGUIRE
Montgomery, Alabama

DR. GEORGE MAJNARICH
Dixon, Illinois
Resident Award

DR. CLARENCE MONROE
Chicago, Illinois

DR. TIMOTHY F. MORAN
Scranton, Pennsylvania

DR. FRANK H. NETTER
East Norwich, New York

DR. VERNON A. NICKEL
Los Angeles, California

DR. J. B. O'DONOGHUE
Chicago, Illinois

DR. JOHN-HENRI OLTRAMARE
Geneva, Switzerland

MR. GEORGE RADCLIFFE
Newark, New Jersey

DR. JOSÉ RAMIREZ D.
Guayaquil, Ecuador

DR. CLYDE L. RANDALL
Buffalo, New York

DR. IRVING REDLER
New Orleans, Louisiana

DR. PETER ROSI
Chicago, Illinois

DR. CURTICE ROSSER
Dallas, Texas

DR. RALPH SAPPENFIELD
Miami, Florida

DR. LOUIS SAVITT
Chicago, Illinois

DR. MAX M. SIMON
Poughkeepsie, New York

DR. RALPH E. SNYDER
New York City

MR. NORMAN C. TANNER
Kingston Hill, Surrey, England

DR. RODERICK D. TURNER
Los Angeles, California

DR. ALFRED H. WHITTAKER
Detroit, Michigan

DR. JOSEPH A. WITT
San Francisco, California

DR. MIKIO YAMAGISHI
Yokohama, Japan

Transcripts Now Available of Papers Read at Rome Congress

All members of the International College of Surgeons who wish to receive copies of papers presented at the Twelfth Biennial International Congress of the International College of Surgeons, May 15-18, 1960, in Rome, Italy, may do so by requesting transcripts of the proceedings of the specialty sessions in which they are interested.

Papers are bound in volumes according to the following classifications:

General Surgery	Surgery of Trauma
Neurosurgery	Heart Surgery
Orthopedic Surgery	Pediatric Surgery
Colon and Rectal Surgery	Urologic Surgery
Ophthalmologic Surgery	Plastic Surgery
Otolaryngologic Surgery	Thoracic Surgery
Obstetric and Gynecologic Surgery	Anesthesiology
Rehabilitation Surgery	Surgical Nursing

If a member desires more than one specialty volume he may secure them by listing those volumes which interest him most.

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Prof. Giuseppe Bendandi
Clinica Chirurgica, Policlinico Umberto 1°
Rome, Italy

TECHNICAL EXHIBITS

THE TWENTY-SIXTH ANNUAL CONGRESS
of the
NORTH AMERICAN FEDERATION
of the
INTERNATIONAL COLLEGE OF SURGEONS

PALMER HOUSE — CHICAGO

MAY 14-18, 1961

ABBOTT LABORATORIES
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Danbury, Conn. **Booth No. 57**

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DEPUY MANUFACTURING COMPANY
Warsaw, Ind. **Booth No. 15**

DePuy—the oldest firm with the newest products—cordially invites you to visit our exhibit.
Many of these new products are on display, including a new concept in Meniscus Knives, Woodward Bone Retractors, an Improved Moore Prosthesis Rasp, Scuderi Wire Set, a unique modification of the Ken Nail, Connor Bankhart Retractors, Hinged Weitlander Retractor, Scuderi Traction Screw, Prigge Ankle Forcep, Scheib Club Foot Splint, Improved Velcro Rib Belts, Automatic Screwdriver, Connor Punch and Reamer, Greteman Nerve Root Retractor, and many other items.
Your new ideas and suggestions will receive prompt action at DePuy. We can give you on-the-spot engineering and developmental help as well as policy decisions on your ideas. Be sure to see us for prompt action.

DESITIN CHEMICAL COMPANY
Providence, R. I. **Booth No. 40**

DESITIN OINTMENT: For treatment of burns, ulcers, diaper rash, abrasions, etc.
DESITIN POWDER: Relieves chafing, sunburn, diaper rash, etc.
DESITIN SUPPOSITORIES and RECTAL OINTMENT: Relieve pain and itching in uncomplicated hemorrhoids, fissures.
DESITIN BABY LOTION: Protective, antiseptic.
DESITIN ACNE CREAM: A non-staining, flesh-tinted "Medicream" for the treatment of Acne Vulgaris.
DESITIN COSMETIC & NURSERY SOAP: Supermild.
DESITIN SUPPOSITORIES with HYDROCORTISONE: Prompt response to inflammatory conditions in proctitis, severe pruritus, edema.

LESTER A. DINE COMPANY
Woodside, N. Y. **Booth No. 12**

Featuring the EASTMAN KODAK STARTECH CAMERA. This new inexpensive camera has quickly become one of the most important tools for the clinical photographer because without any previous experience it is possible to make ideal color slides. Accessories for the KODAK STARTECH include an excellent X-ray Copying Device and a Copy Attachment for copying from a book or magazine.

DOHO CHEMICAL CORPORATION
New York, N. Y. **Booth No. 65**

MALLON DIVISION OF DOHO presents:
DERMOPLAST: Bactericidal and fungicidal aerosol spray especially useful in Obs-Gyn, following perineal suturing etc. Also fast relief in surface pain, burns, wounds, abrasions, and sunburn.
RECTALCAN: Liquid topical relief of pain and itching in hemorrhoids, pruritus, etc. Bactericidal and Fungicidal.
RECTALYT HC: Revolutionizing every previous concept in proctologic medication and therapy. Water-miscible polymer vehicle containing Hydrocortisone—Sulfauridin. In a soft plastic, disposable, measured, uniform single dose, container-applicator.

DUKE LABORATORIES, INC.
South Norwalk, Conn. **Booth No. 22**

Duke Laboratories, Inc., will exhibit its specialty products: Elastoplast bandages, cotton-woven, adhesive surfaced, stretchable; Elastoplast Unit Dressings; Gelocast, prepared Unna-paste bandage; Nivea Creme, Nivea Skin Oil and Basis Soap for patients with dry, sensitive skin.

DYNAMICS CORPORATION OF AMERICA
East Elmhurst, L. I., N. Y. **Booth No. 66**

EATON LABORATORIES, INC.
Norwich, N. Y. **Booth Nos. 59-60**

NEW FURADANTIN® (brand of nitrofurantoin) SODIUM FOR INTRAVENOUS USE—an alternative route of administration for Furadantin in patients unable to take oral medication.
FURADANTIN SODIUM for Intravenous Use fills a need for a parenteral form in the treatment of genitourinary infections, such as pyelonephritis, pyelitis, cystitis, prostatitis—and in selected systemic infections—even some which have failed to respond to other antibacterial therapy.

EISELE & COMPANY
Nashville, Tenn. **Booth No. 79**

Eisele & Company will exhibit their regular line of hypodermic syringes, both the regular and inter-changeable type, hypodermic needles, clinical thermometers, elastic bandages, specialty glass ware and other related items.

ENCYCLOPEDIA AMERICANA
Grand Rapids, Mich. **Booth No. 23**

Encyclopedia Americana invites you to inspect their 1961 edition which leading educators find superior and prefer to any other reference work. No accredited school college university or library is without it. The United States Government has ordered more than a thousand sets for use in all major departments. Your visit to our booth will be most cordially welcomed and we have a souvenir for you without obligation.

ENCYCLOPAEDIA BRITANNICA
Chicago, Ill. **Booth No. 93**

A great New Edition of the Encyclopaedia Britannica and its correlated fact finding and technical research services will be on display at this meeting.
To those who may be interested in acquiring Britannica, there is available a special exhibit discount.
Whether your interest is current or for the future, please visit our booth.
You need not invest to investigate.

C. B. FLEET COMPANY, INC.
Lynchburg, Va. **Booth No. 74**

THE ENEMA: INDICATIONS AND TECHNICS, a liberally illustrated brochure describing the history of enema medication and administration, is available to you at Booth No. 74. You will also find interesting and authoritative clinical and time-cost studies on routine hospital use of disposable enemas.

FLORIDA BRACE CORPORATION
Winter Park, Fla. **Booth No. 88**

Florida Brace Corporation, Booth No. 88, will exhibit The Jewett Hyperextension Brace for cases requiring positive hyperextension, and post spinal fusions. They will also exhibit The Davidson-Jewett Flexion Brace; the F.B.C. Abduction Splints; and various types of plastic adjustable cervical collars.

FULLER PHARMACEUTICAL COMPANY
Minneapolis, Minn. **Booth No. 90**

TUCKS and its new witch hazel analoge TRIAMEL Ointment and Cream are both on hand to renew old acquaintance and make new friends. Another interesting item is the FULLER SHIELD, specifically designed for use after anorectal surgery—no tape—no soiled linens—a time saver in every way. TUCKS, TRIAMEL and the FULLER SHIELD for personal use or clinical trial will be gladly sent you on request.

JOHN F. GREER COMPANY
Oakland, Calif. **Booth No. 92**

Product display and demonstration will be conducted during the convention by Mr. and Mrs. Greer on the proper use of the GREER COLOSTOMY COMPACT for the care of the Colostomy.
Samples of DERMA-GUARD, a protective, adhesive powder for irritated skin surfaces will be available by registration at the booth.

GUARDIAN CHEMICAL CORPORATION
Long Island City, N. Y. **Booth No. 99**

The company will exhibit its Clorpactin XCB for use in destroying viable tumor cells to prevent local recurrence after cancer surgery, and Clorpactin WCS-90 for prevention of postoperative infections and the treatment of antibiotic-resistant infections. (Clorpactin WCS-90 is now distributed by Dorsey Laboratories, Lincoln, Nebraska.)

PAUL B. HOEBER, INC.
New York, N. Y. **Booth No. 89**

Among the many important new books on display are the first five volumes in the well-known Pack & Ariel series—TREATMENT OF CANCER AND ALLIED DISEASES, Allen & Barrow's ABDOMINAL SURGERY, Homburger-Fishman's PHYSIOPATHOLOGY OF CANCER, Martin's SURGERY OF HEAD AND NECK TUMORS, Davis' SURGICAL PHYSIOLOGY, the Second Edition of Caley's NEOPLASMS OF BONE, and Hollinshead's ANATOMY FOR SURGEONS in three volumes.

INTERNATIONAL COLLEGE OF SURGEONS
Chicago, Ill. **Booth Nos. 55-56**

The International College of Surgeons presents detailed information concerning the activities of the College in all their phases, the principles upon which the organization is founded and functions, the location of its component Sections throughout the world, its general and educational program and the extent of its activities. Information regarding Membership in the International College may be secured at our Booth.

JONES MEDICAL INSTRUMENT COMPANY
Chicago, Ill. **Booth No. 50**

Introducing the "PULMONOR," simplifying waterless pulmonary function tests including M.B.C., T.V.C., and Flow Rates for the hospital, office, or patient's bedside. Per Cent and Rate of Flow Scale eliminates such mathematical calculations, including subnormal values.
PULMONOR II, for surgical respiration monitoring, and a new Cardiac Defibrillator will also be displayed.

LEDERLE LABORATORIES
Pearl River, N. Y. **Booth No. 58**

Your Lederle representative will be on hand to serve you. He can furnish information on any Lederle product and is prepared to bring to bear on any of your medical problems the knowledge of the world-wide Lederle research organization.

ELI LILLY & COMPANY
Indianapolis, Ind. **Booth Nos. 18-19**

You are cordially invited to visit the Lilly exhibit located in space numbers 18 and 19. The Lilly sales people in attendance welcome your questions about Lilly products and recent therapeutic developments.

J. B. LIPPINCOTT COMPANY
Philadelphia, Pa. **Booth Nos. 81-82**

J. B. Lippincott Company presents, for your approval, a display of professional books and journals geared to the latest and most important trends in current medicine and surgery. These publications, written and edited by men active in clinical fields and teaching, are a continuation of more than 100 years of traditionally significant publishing.

P. LORILLARD COMPANY
New York, N. Y. **Booth No. 96**

P. Lorillard Company invites you to visit the Kent Cigarette Exhibit.
We are presenting the Story of Kent Cigarettes. And a big part of that story is why you'll feel better about smoking with the taste of Kent.
Kent with the Micronite filter refines away harsh flavor . . . refines away hot taste . . . makes the taste of a cigarette mild.
A table cigarette box with your signature in gold will be a pleasant souvenir of your visit to the convention.

MARSHALL ERDMAN & ASSOCIATES, INC.
Madison, Wis. **Booth No. 42**

425 doctors in 25 states are officed in Erdman Medical Buildings. Each building is custom designed to accommodate the type of practice and to conform to the topography of the site. The custom-designed building is prefabricated in the plant and shipped to the site. Erdman claims efficiency of floor planning, economy in costs and speed of construction. The complete construction is handled by Erdman.

MEDCO PRODUCTS COMPANY
Tulsa, Okla. **Booth No. 101**

Presenting the MEDCO-SONLATOR. Providing a new concept in therapy by combining muscle stimulation and ultra sound simultaneously through a SINGLE Three-Way Sound Applicator.
The MEDCO-SONLATOR is a distinct advance in the effectiveness of physical therapy in your office or hospital. A few minutes spent in our booth should prove of value to your practice.

MEDICAL AIDS, INC.
Park Ridge, Ill. **Booth No. 76**

Medical Aids, Inc. features a complete line of pressure bandages used in the treatment of varicosities, phlebitis, leg ulcers, and other diseases of the extremities. Also on display are the various types of English-made zinc oxide tapes, plastic strapping, individual dressings, and other medicated bandages. Also featuring a complete line of Swedish Stainless Steel Surgical instruments.

MERCK SHARP & DOHME
West Point, Pa. **Booth No. 9**

'LYOVAC' 'THROMBOLYSIN' fibrinolysin (human) for use to promote the dissolution of certain intravascular thrombi is featured.
'STRIATRAN,' effective in relieving the anxiety and tension associated with a variety of clinical situations, and 'DECADRON' for symptomatic treatment in patients with allergic and inflammatory disorders, are also of interest.
Technically trained personnel will be present to discuss these and other subjects of clinical interest.

MILEX PRODUCTS
Evanston, Ill. **Booth No. 44**

The Milex Display will feature the new MILEX WIDE-SEAL DIAPHRAGM, a new concept in contraceptive technique.
MILEX representatives will be happy to explain the many advantages of AMINO-CERV GEL, the new proteolytic amino-acid cervical jelly for the treatment of cervicitis, and post-partum cervical tears; it is also excellent for post-operative use following any cervical surgery.
Other well-known MILEX GYNECIC SPECIALTIES and CANCER DETECTION INSTRUMENTS will be prominently featured as well.

MILLER SURGICAL COMPANY
Chicago, Ill. **Booth No. 30**

See the Miller Electro-scalpel, Mark C Model, Miller Radiotherm, and Surgidyne (Tube & Spark Gap Unit.) These cutting, coagulating and desiccating units are calibrated to do the most delicate work as well as light major surgery. Accessories such as Snares, Coagulator w/smoke ejector, Suction Tubes and Grasping Forceps, also available. Also a long outstanding line of Diagnostic equipment consisting of Illuminated Otoscopes, Ophthalmoscopes, Eyespud w/Magnet, Transilluminating Lamps, Headlites, Vaginal speculum w/smoke ejector and Gorsch designed Stainless Steel Proctoscopes and Operating scopes, all sizes with magnification. Available also the Variable Wall Rayostat which converts battery operated equipment to electric.

V. MUELLER & COMPANY
Chicago, Ill. **Booth No. 3**

V. Mueller & Company's comprehensive display of fine surgical instruments will be of interest to every surgeon. Discussion of new technique and your instrument problems is particularly invited. The Muller cardiovascular and Glassman intestinal clamps and the Moerch Piston Respirator will be shown.

ORTHOPEDIC FRAME COMPANY
Kalamazoo, Mich. **Booth No. 54**

New Products for 1961: Electric PADDING CUTTER zips through felt, stockinette, wadding and all soft material. All NEW WALKING HEELS for plaster casts—NEW CAST TABLE, simple, compact, inexpensive—NEW BATE HAND DERMATOME and new accessories for the Stryker Bone Saw, Dermatome, Power Drill and Screwdriver, will be on display.

PARKE, DAVIS & COMPANY
Detroit, Mich. **Booth No. 2**

Medical service members of our staff will be in attendance at our booth to discuss important Parke-Davis specialties which will be on display.

PFIZER LABORATORIES
Brooklyn, N. Y. **Booth No. 17**

Professional Service Representatives from Pfizer Laboratories will be pleased to have you in attendance at their booth to discuss the latest products of Pfizer research.

R. J. REYNOLDS TOBACCO COMPANY
Winston-Salem, N. C. **Booth No. 73**

Welcome to the R. J. Reynolds Tobacco Company Exhibit! You are cordially invited to receive a cigarette case (monogrammed with your initials) containing your choice of CAMEL, WINSTON Filter, Menthol Fresh SALEM, or CAVALIER King Size Cigartttes.

RITTER COMPANY, INC.
Rochester, N. Y. **Booth No. 34**

Showing Ritter Motor Hydraulically Operated Multi-Level Examination and Treatment Tables; the Liebel-Flarsheim Bovie Electrosurgical Units; and Castle Office Examining Lights and Autoclave Sterilizers. Competent representatives will be on hand to demonstrate the equipment and show you just how it can help you in your daily practice.

ROCHE LABORATORIES
Nutley, N. J. **Booth No. 10**

Tigan—a specific antiemetic agent effective both prophylactically and therapeutically against most clinically significant types of nausea and vomiting.
Librium—a therapeutic agent for superior, safer, faster control of nervousness, anxiety, tension and other common emotional disturbances without the dulling effect or depressant action to the tranquilizers.

W. B. SAUNDERS COMPANY
Philadelphia, Pa. **Booth Nos. 7-8**

New Saunders' titles of special interest to the clinical surgeon include: Edwards: An Atlas of the Heart and Great Vessels; Nagan: Medical Almanac; Mulholland II: Current Surgical Management; Quigley and Banks: Fractures and the Always New Surgical Clinics of North America. Journal of Surgical Research—An entirely new concept will just be ready for the meeting.

DENNIS R. SCANLAN, INC.
St. Paul, Minn. **Booth No. 86**

The complete line of Scanlan Swedish stainless steel surgical instruments, known the world over for their quality and design, will be displayed. Scanlan instruments are manufactured in Sweden, at factory established in 1808. Stop in and see our many new and improved instruments.

SCHOLL MFG. COMPANY, INC.
Chicago, Ill. **Booth No. 16**

Registered Nurses will be in attendance to welcome you to our exhibit, and to demonstrate the latest techniques of bandaging with Tubegauz, the seamless, tubular gauze dressing.
We will also show our new Double Seal Porous Adhesive Tape, plus other new items in the Orthopedic and Surgical Dressing field.

SCIENTIFIC EQUIPMENT MFG. COMPANY
Seattle, Wash. **Booth No. 77**

The Knott Technic of blood irradiation has proved a safe and efficient means of rapidly controlling many viral pathologies, particularly viral hepatitis. Its rationale includes Increase of blood oxygen, Increased phagocytosis, Relief of toxemia and Decrease of edema. The Knott Hemo-Irradiator will be demonstrated in our booth twice daily.

SMITH, KLINE & FRENCH LABORATORIES
Philadelphia, Pa. **Booth No. 97**

Our Representatives welcome the opportunity to discuss SK&F products with you and are ready always to be of help in any way they can. Products featured at this meeting are: (1) Parnate®; (2) Compazine®; and (3) Stelazine®.

E. R. SQUIBB & SONS
New York, N. Y. **Booth Nos. 62-63**

E. R. Squibb & Sons, Division of Olin Mathieson Chemical Corporation, has long been a leader in the development of new therapeutic agents for prevention and treatment of disease. The results of our diligent research are available to the medical profession in new products or improvements in products already marketed. At booth Nos. 62 and 63, we are pleased to present up-to-date information on these advances for your consideration.

WILMOT CASTLE COMPANY
Rochester, N. Y. **Booth No. 67**

Representatives will demonstrate Castle's new 5-section operating table, first operating table readily adjustable to the anatomy of the individual patient. The Company's new L-800 Series Twinlights, dual-beam flexible overhead operating lights for major and minor surgery, will also be shown.

F. E. YOUNG & COMPANY
Chicago, Ill. **Booth No. 80**

F. E. Young & Company, Booth No. 80, will exhibit Young's Dilators used in the treatment and prevention of contracted anus, particularly following hemorrhoidectomy. Also, as an aid in perineal dissection; repair following delivery and vaginal surgery. Young's PSP Test Set, Albumin Test and Jen-i-sol will also be shown.

ZIMMER MFG. COMPANY
Warsaw, Ind. **Booth Nos. 5-6**

Full exhibition and explanation of the HemoVac Pump and Wound Tubing, as well as many new items for Fractures and Orthopaedic Surgery.

LATE ADDITIONS

CANADIAN HOSPITALITY CENTER
INTERNATIONAL COLLEGE OF SURGEONS
WOMEN'S AUXILIARY AND
CANADIAN MEN'S SECTION **Booth No. 75**

The Women's Auxiliary Canadian Section will serve coffee 10:00 a.m.-11:00 a.m. each morning and 2:00 p.m.-3:00 p.m. each afternoon at the hospitality center located in the exhibit hall.
It will be the pleaseure of the Canadian Section to welcome all Doctors and their wives to join with us in a feeling of warmth and friendship.

DR. S. JACKSON
Washington, D. C. **Booth No. 100**

Supramid Extra, the cable-type suture—polyfilament but neither braided nor twisted. Stronger than any other suture material, it has perfect tissue tolerance, is re-autoclavable and easily handled. It stays tied. Supramid Extra surgical tubing, autoclavable, thinnest wall of any tubing on the market and flexibiity can be controlled. Stainless steel scissors-needleholder combination.

Visit the Technical Exhibits

They are a valuable part of our teaching program

ADVERTISERS' INDEX

American Cyanamid Company *Exhibitor—Booth No. 57*	New Silicone-Treated Sutures	I-II
American Sterilizer Co. *Exhibitor—Booth Nos. 13-14*	AMSCO "Lectrapoise" Powerized Operating Table	Inside Back Cover
Appleton-Century-Crofts, Inc.	"Maingot's Abdominal Operations"	XXVIII
Baxter Laboratories, Inc. *Exhibitor—Booth No. 84*	TIS-U-SOL™	XV
Berivon Company	The Rush Medullary Pin	XXIV
Birtcher Corporation	Electrosectilis	Outside Back Cover
Wilmot Castle Company *Exhibitor—Booth No. 67*	112 Light Beams	Inside Front Cover
Cook County Graduate School of Medicine	Annual Postgraduate Course	XI
Davol® Rubber Company	"New Radiopaque Penrose Drains"	V
Desitin Chemical Company *Exhibitor—Booth No. 40*	Desitin® Ointment	XXI
Eaton Laboratories *Exhibitor—Booth Nos. 59-60*	Furadantin®	XVI-XVII
Ethicon, Inc.	Mersilene®	XIX-XX
John F. Greer Co. *Exhibitor—Booth No. 92*	Greer colostomy compact	X
Guardian Chemical Corporation *Exhibitor—Booth No. 99*	Clorpactin® X C B*	VII
Industrial Medicine & Surgery	"Month to Month Textbook on Aspects of Industrial Surgery"	XIV
Lea & Febiger—Publishers	Partipilo—"Surgical Technique & Principles of Operative Surgery"	XXV
The Macmillan Company	Cutler and Zollinger—"Atlas of Surgical Operations" 3rd Edition	XXVI
The C. V. Mosby Company	New Mosby Surgery Books	X
V. Mueller & Co. *Exhibitor—Booth No. 3*	A Most Significant "Signature" in Surgery	XXIII
Myopexy Association	Aaron N. Gorelik, M.D., F.I.C.S. (deceased) "Cardiopericardimxopexy"	XXVI
Parke, Davis & Company *Exhibitor—Booth No. 2*	Elase® . . . "in infected surgical wounds"	IX
W. B. Saunders Company *Exhibitor—Booth Nos. 7-8*	Announcing "The Journal of Surgical Research" First issue—May 1961	XXVI
Charles C Thomas • Publisher	For Surgeons: "Early 1961 Books"	VIII
The Williams & Wilkins Company	"Outstanding new and recent books in surgery"	VI
Union Park Hotel	"In the Chicago Medical Center"	X
Zimmer® Manufacturing Co. *Exhibitor—Booth Nos. 5-6*	"HemoVac"	XII-XIII

"EXHIBITOR Booth Nos." indicates that the concerns listed on this page have exhibit space at the Twenty-Sixth Annual Congress of the North American Federation, International College of Surgeons, Chicago, May 14-18, 1961.

COLLÈGE INTERNATIONAL DE CHIRURGIENS
GENÈVE '35
FOUNDED BY DR. MAX THOREK

The Journal of the International College of Surgeons

Official monthly publication of the International College of Surgeons
FOUNDED BY DR. ANDRE CROTTI

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Chicago, Illinois

Allied Sciences
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COLLÈGE INTERNATIONAL DE CHIRURGIENS

FOUNDED BY DR. MAX THOREK

You are cordially invited to attend

The Fifth Annual Meeting
of the
Northeastern Region—United States Section
International College of Surgeons

Place: **Chatham Bars Inn—Chatham (Cape Cod), Mass.**

Time: **July 1-4, 1961**

States and Regents comprising the Northeastern Region

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78 Highland Street, Plymouth

VERMONT
Weston Chadwick Hammond, M.D., F.I.C.S.
311 Service Building, Rutland

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146 Chestnut Street, Springfield

RHODE ISLAND
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208 Governor Street, Providence

CONNECTICUT
Anthony J. Mendillo, M.D., F.A.C.S., F.I.C.S.
45 Trumbull Street, New Haven 10

PROGRAM

July 1—Registration
Recreation

July 2—Educational Program
Medical Economics
Scientific Movies

July 3—Scientific Sessions

July 4—Farewell Luncheon
at noon.

For the Committee
M. Leopold Brodny, M.D., F.A.C.S., F.I.C.S.
4640 N. Marine Drive, Chicago 40, Illinois

For information, write to Secretary, United States Section, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10, Ill.

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